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Analysis and Review of the Job Enlargement Concept

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To the Graduate Council:

I am submitting herewith a thesis written by William Henry Dyke entitled "Analysis and Review of the Job Enlargement Concept." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Management Science.

Merrill H. Whitlock, Major Professor

We have read this thesis and recommend its acceptance:

A. J. Keally, W. Gelbert, Charles P. White

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

February 26, 1963

To the Graduate Council:

I am submitting herewith a thesis written by William Henry Dyke entitled "Analysis and Review of the Job Enlargement Concept." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Industrial Management.

Major Professor

We have read this thesis and recommend its acceptance:

Accepted for the Council:

Dean of the Graduate School

ANALYSIS AND REVIEW OF THE JOB ENLARGEMENT CONCEPT

A Thesis

Presented to

the Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

William Henry Dyke

March 1963

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CHAPTER I

INTRODUCTION

> We have yet to learn how to do the second half of the job of which Taylor and Gantt did the first half fifty years ago. They split up the operation into its constituent motions; we shall have to put the motions together again to produce an operation that is based both on the unskilled elementary motion and on the specifically human ability and need to cooperate.[1]
>
> Peter F. Drucker

Adam Smith stated that the division of labor is a forerunner of and a necessity to a successful economical system.[2] Extended and refined, the division of labor results in the type of job specialization that Drucker refers to above--" . . . split up the operation into its constituent motions . . ."--but job specialization goes one step farther and assigns only a few of these motions to any one operator. The division of labor of Smith's day resulted in some men being blacksmiths, some being carpenters, some being millers, etc.; but the job specialization as pioneered by Taylor, Gantt, and Henry Ford resulted in a much finer breakdown of tasks. Taking

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[1]Peter F. Drucker, The New Society (New York: Harper and Brothers, 1949), p. 173.

[2]Adam Smith, Wealth of Nations (New York: Random House, 1937), pp. 3-21.

the blacksmith as an example, the specialization found in some mass production industries of today would find one man assigned to hold the shoe on the anvil, another to beat it to its proper shape, a third to quench it while a fourth would apply it to the horse's hoof.

In the years that have elapsed since Drucker noted that the task of job design is only half complete, a number of individuals from the fields of psychology, industrial engineering, and personnel management have contributed toward the completion of that task. This paper examines those contributions which comprise the broad area of job design called "job enlargement."

I. THE PROBLEM

Statement of the problem. The advent of mass production techniques has triggered investigations into the effects of semi- or non-skilled repetitive work upon the worker. These effects, their underlying causes, and associated phenomena have been found to be exceedingly complex. The interactions of physical and psychological forces were first noted by the Harvard University group conducting the Hawthorne Studies in the 1920's. Roethlisberger and Dixon wrote that " . . . Monotony in work is primarily a state of the mind and cannot be assessed

on the basis of output data alone."[3]

The most common approach to the problem of the ill effects of repetitive work has been through a more scientific approach to job design. As Buffa notes:

> In general, job content is most commonly not consciously designed, but is the result of limitations of production, quotas, product designs, machine designs, layouts, pacing effects, and the desire to make skill requirements uniform within jobs.[4]

A number of job design criteria have been developed; perhaps the best known being job enlargement. There have been a number of investigations into the area of job enlargement but for the most part these have been independent, incomplete, and only generally indicative of broad trends. The few exceptions, however, are most noteworthy.

The purpose of this paper, then, is threefold:

1. To bring together in one place all of the recorded studies undertaken in the field of job enlargement, to examine, evaluate, and consolidate the findings of these studies;
2. To examine the aspects of job enlargement in the light of accepted engineering and production

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[3]F. J. Roethlisberger and William J. Dixon, Management and the Worker (Cambridge: Harvard University Press, 1939), p. 127.

[4]Elwood S. Buffa, "Toward a Unified Concept of Job Design," Journal of Industrial Engineering, XI (July-August, 1960), 347.

techniques; and

3. To examine the aspects of job enlargement in the light of various related psychological experiments dealing with work, motivation, boredom, monotony, satiation, etc.

Importance of the study. Many of the independent investigations into the value of job enlargement have taken place under specific, "one-time" conditions. Conclusions arrived at in one study have too often directly contradicted the evidence presented in another; the result being that an individual who might be familiar with only one or two of the studies would tend to receive a biased interpretation of the true value of job enlargement. The value, then, of the consolidation of these studies is obvious. This paper also shows that there are serious gaps in the data and points out where these gaps occur and how the defect may be remedied. Most important, perhaps, this paper identifies certain psychological phenomena which may, in later experiments, be shown to contribute to those effects of repetitive work that engineers and psychologists are attempting to minimize through the use of job enlargement.

II. DEFINITIONS OF TERMS USED

Job enlargement. Argyris defines job enlargement as

". . . the increase of the number of tasks performed by the employee along the flow of work. It is the lengthening of the time cycle required to complete one unit of operation."[5] This concise definition has been further explained and expanded throughout the paper.

Two important restrictions to the use of the term "job enlargement" should be noted. First, the term as it is used in this paper applies only to the first-level employee. The enlargement of the supervisor's job, while important, is concerned with somewhat different variables and underlying assumptions; it would be better analyzed by considering it to be a field of study in itself. Second, none of the other techniques which are designed to minimize the ill effects of repetitive work, i.e. job rotation, participation, competitive teams, rest pauses, music, broader employee training, etc., should be thought of as facets of job enlargement; these tools may be quite valuable and indeed some of them are investigated in this paper as possible companions to job enlargement, but as it has been defined here, job enlargement is quite independent of other techniques.

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[5]Chris Argyris, Personality and Organization (New York: Harper and Brothers, 1957), p. 177.

Job specialization. Job specialization consists of dividing a job into the smallest divisions possible and assigning each of these divisions, now variously called "operations," "jobs," or "tasks," to an individual worker. An operation or task may consist of only two or three motions, or it may consist of ten or fifteen. Is there a maximum number of motions that still may fit into this definition then; i.e., when a job may be called "specialized"? Many psychologists feel that a job is specialized only when the worker performing it perceives it to be specialized. As Blum, speaking about monotony in a similar vein, notes, "The only job that is monotonous is the one which the worker who does it regards as monotonous and this is true regardless of the occupational level."[6]

Work simplification. The concept of simplifying work does not conflict with the concept of enlarging the job. Work simplification involves the elimination of waste motion and a reduction in the inefficient use of physical energy. Warren makes this clear by stating:

> There is not conflict between simplification and enlargement. Elliot[7] has emphasized that what is

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[6]Milton L. Blum, Industrial Psychology and Its Social Foundations (New York: Harper and Brothers, 1956), p. 382.

[7]J. D. Elliott, "Job Enlargement Increases Productivity," Proceedings of the Seventh Annual Industrial

needed is work simplification and job enlargement. It is a mistake to simplify jobs, he believes, since this is what causes boredom and lack of interest. Job enlargement, on the other hand can result in work simplification through consolidation of activities.[8]

Work inhibition. This concept, which will be discussed in more detail later in the study, is defined in this manner by Underwood:

> Learning, it has been said, is a logical construct; it is a hypothetical process inferred from an observed increment in performance. There is another logical construct applicable when a decrement in performance occurs with continued repetition of a response under conditions which might previously have yielded an increment. This construct may be called work inhibition.[9]

Boredom and Monotony. It is a common practice to use the terms "boredom" and "monotony" interchangeably; for the purposes of this study, however, a subtle difference should be noted. Maier writes:

> . . . the words tedium and monotony are employed to describe the state of mind caused by repetitive work. They refer to the experience of sameness without implying emotional distaste. The term boredom will be used as a more inclusive term, taking in the person's unfavorable outlook and feeling tone for the task he

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Engineering Institute of the University of California, Elliott Printing Co., Oakland, California, 1955, as cited in Warren.

[8]Neil Warren, "Job Simplification Versus Job Enlargement--Psychological Aspects," Journal of Industrial Engineering, IX (September-October, 1958), 438.

[9]Benton J. Underwood, Experimental Psychology (New York: Appleton-Century-Crofts, 1949), p. 561.

is performing.[10]

Satiation. The phenomenon of satiation was first noted in experiments carried out in Germany in 1928.[11] Satiation is marked by an almost complete breakdown of the will to continue a repetitive task, but the concept itself is better explained than defined. A more complete investigation into the phenomenon will be conducted later in the study.

Job rotation. The rotation of workers among a series of different jobs is another approach to the problem of reducing the boredom that is so often caused by performing a repetitive task for an extended period of time. The typical plan involves moving each operator in a group of jobs to another position at stated intervals. The attempt is usually made to alternate jobs that are somewhat varied with those that are more repetitive.

III. SOURCES OF INFORMATION

The material for this study has come from books and periodicals dealing with psychology, labor relations, indus-

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[10]Norman R. F. Maier, Psychology in Industry (Boston: Houghton Mifflin Company, 1955), p. 468.

[11]A. Karsten, "Psychische Sattigung," Psychol. Forsch., X (1928), 142-154, cited by Norman R. F. Maier, Psychology in Industry (Boston: Houghton Mifflin Company, 1955), pp. 471-474.

trial engineering, personnel management and related subjects as well as those dealing specifically with job enlargement. In addition, much information has been gathered from unpublished theses, conference proceedings, and from personal correspondence with individuals noted for their contributions to this area of study.

IV. METHOD OF ANALYSIS

The first step in analyzing the published information dealing with job enlargement consists of a short history of job design practices, showing the gradual shift from the craftsman concept to job specialization and then charting the humanitarian movement which fostered job enlargement.

The most significant investigation into the area of job enlargement, an experimental study carried out by A. R. N. Marks,[12] is next analyzed in detail. It is from this study that most of the valuable data supporting job enlargement have come.

The following chapter contains a discussion of additional contributions in the specific areas of job enlargement and job design. These studies are carefully evaluated with respect to their relative value to the conscientious investigator.

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[12]A. R. N. Marks, "An Investigation of Modifications

A discussion of related psychological and physiological factors is then undertaken, and it is shown how these phenomena relate to job design theory. Many of these factors are instrumental in analyzing the results of previous job enlargement studies.

The concluding portion of the paper sums up the existing data and identifies those problem areas associated with the type of experimentation carried out by most of the investigators. Finally, practical solutions are proposed and suggestions for future investigations are given.

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of Job Design in an Industrial Situation and Their Effects on Some Measures of Economic Productivity," PhD Dissertation, Unpublished, University of California, Berkeley, 1954.

CHAPTER II

HISTORY

I. THE BEGINNING OF THE DIVISION OF LABOR

> Specialization belongs to the natural order; it is observable in the animal world, where the more highly developed the creature the more highly differentiated its organs; it is observable in human societies where the more important the body corporate, the closer is the relationship between structure and function.[1]
>
> Henri Fayol

The division of labor predates the beginnings of recorded history: writing in the Illiad, Homer speaks of shepherds, makers of armour and farming implements, and tanners; ancient Egyptian writings speak of large ore smelters and of merchants and dye-makers; while the Bible records that the Israelites were brickmakers for the Egyptian nation prior to their great exodus.[2] It is not surprising to see this early evidence of the division of labor if two points are noted: first, written histories were usually confined to those times and locations which were famed for flourishing civilizations. Second, it was only through the division of labor that these relatively

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[1]Henri Fayol, General and Industrial Management (London: Sir Isaac Pitman and Sons, 1949), p. 20.

[2]The Bible, Exodus 1:14

advanced civilizations came into being. Plato noted that Socrates recognized that the division of labor is the most efficient form of social-economic structure:

> . . . we must infer that all things are produced more plentifully and easily and of a better quality when one man does one thing which is natural to him and does it at the right time, and leaves other things.[3]

As civilizations grew and as trade with foreign markets became more common, the division of labor became more pronounced. It naturally followed that an individual could produce better quality items and become more proficient in a trade if he spent the better part of his life doing a particular type of work, and in many respects the reputation of a man in the community depended upon the quality of his craftsmanship. Adam Smith proposes this advancement of the division of labor as the primary reason for the exceptional wealth and degree of civilization of a select group of nations.[4]

For the most part the craftsman worked alone. Each may have had a number of apprentices or students working with him, but as a rule these were not permanent employees; each apprentice was only serving as a subordinate for a

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[3]Dialogues of Plato: The Republic, Book II.

[4]Adam Smith, Wealth of Nations (New York: Random House, 1937), pp. 3-21.

period of time prior to becoming a craftsman in his own right. There was, then, no managerial function as such; that is, there were few if any shops where a group of workers might perform only part of a task while being supervised by a foreman.

The industrial revolution was largely responsible for a reversal of the trend: people began to band together into shops and factories to take advantage of special purpose tools, equipment, and, in general, more stable wages. Capitalism resulted in a more definite division of labor by bringing people together; it was soon obvious that work could be more efficiently performed by splitting the job up into individual elements. In 1776 Smith noted that twenty-six different jobs were necessary for the manufacture of common pins.[5]

Smith in 1776 and Charles Babbage in 1833 recounted the virtues of specialization. Smith listed three advantages: (1) improved dexterity from doing one job again and again, (2) savings of time usually lost in moving from job to job, and (3) economic feasibility of special purpose machinery to assist human labor.[6] To these, Babbage added

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[5] Ibid.

[6] Ibid.

the following: (4) less learning time is involved, and less material is wasted through beginners' mistakes, and (5) the efficient manager can purchase both skill and strength, qualities not usually present in a single worker.[7]

Spurred on by the utilization of interchangeable parts, specialization continued to grow and develop throughout the nineteenth century. Toward the latter part of that century it reached full maturity through the work of a number of men who developed what was known as Scientific Management.

II. SCIENTIFIC MANAGEMENT

The work done by Taylor, Gantt, and Frank Gilbreth established three more facets in the concept of the division of labor:

1. Gilbreth, by using the motion study technique, was able to establish the "one best way" of doing a job. This clearly defined each movement and so made it easier to break the job into its component parts, but also had a tendency to restrict individual initiative.

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[7]Charles Babbage, The Economy of Manufactures (London: Charles Knight, 1833), pp. 169-176.

2. More careful attention was paid to training the worker and providing him with the proper tools. Taylor spent a great deal of time designing these special purpose tools, drawing up tables of cutting or grinding speeds in machining, and devising other means of making the worker more proficient at performing his particular task.
3. Taylor also refined the concept of personnel placement. He was very careful to try to assign each worker to the job he was best able to perform; the job, however, became the independent variable with the worker being expected to adapt to its requirements.

III. MECHANIZATION AND SPECIALIZATION

The conveyorized production line made its appearance in the early part of the twentieth century. As the pioneer of mass production, Henry Ford was one of the first to realize that a man works more efficiently when his work is brought to him than he does when he must travel to his work.[8] The ensuing large scale movement of material depended upon careful planning, exact timing,

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[8]"Was Charlie Chaplin Right?" Fortune, XLVI

and a precise definition of each elemental task along the line of flow. The complexity of each man's job was dependent upon the speed at which each unit appeared in front of him--if he were faced with a new automobile every thirty seconds, then his series of tasks could not last longer than thirty seconds before the cycle began to repeat.

As special purpose machines came into being, man was forced to adjust to their time cycles and motions. The machines freed him from many manual tasks but at the same time they patterned him after themselves, restricting him to the functions of an intelligent, special purpose machine.

Today, in many industries, this concept of specialization is regarded as a prerequisite to efficient job design. Typical of the modern view is this statement by Gardner and Moore:

> . . . the employee who concentrates his energies and attention on one task is able to achieve a higher degree of skill and proficiency than if he scatters his efforts among several activities. Furthermore, he does not waste time moving from one job to the next. Moreover, it is easier to train him and takes less time. In addition, job specialization facilitates better administrative control over work activities. Finally, wages and salaries can be more accurately

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(August, 1952), 66.

adjusted to the level of work performed and to the skill and proficiency involved.9

It is interesting to note that this view is not confined to the manufacturing plant but has become introduced into clerical work as well. Many instances have been recorded in which the processing and filing of documents have been split up and assigned to a number of individuals in accordance with the best principles of job specialization. An investigation of the use of job enlargement in conjunction with clerical work has been effectively carried on by the Detroit Edison Company; the results of this study will be examined during the course of this paper.

IV. THE HUMANITARIAN MOVEMENT IN LABOR

Another movement began to take place in the 1920's; a movement which, though completely divorced from the blossoming mass production trend, paralleled it very closely in time. Research psychologists and sociologists, both in this country and in Great Britain, began to study the impact upon men of the ever increasing pressure of

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9Burleigh Gardner and David Moore, Human Relations in Industry, (Homewood, Ill.: Richard D. Irwin, Inc., 1955), pp. 10-11.

industrial mechanization and machine technology. Studies were carried out by Hoppock[10] in the early 1930's, by Mayo[11] in the late 1920's and early 1930's, including the famous Hawthorne Experiments, and by Wyatt[12] in the 1920's and 1930's in Great Britain. As work of this type was extended to more and more industrial situations a significant amount of information began to accumulate. Each new theory pressed back the frontier of knowledge and increased man's appreciation of the magnitude of psychological influences in the industrial environment.

Shortly after World War II this emphasis on the human element in industrial situations began to attract attention. Many categories of study began to grow, each being centered around the individual in the industrial environment: labor relations, industrial psychology, occupational psychology, employee counselling, job placement, morale, and motivation were some of the terms that gained widespread usage during this period.

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[10] R. Hoppock, Job Satisfaction (New York: Harper and Brothers, 1935).

[11] F. J. Roethlisberger and William J. Dixon, Management and the Worker (Cambridge: Harvard University Press, 1939).

[12] S. Wyatt and J. N. Langdon, Fatigue and Boredom in Repetitive Work, Industrial Health Research Board Report No. 77 (London: 1937), and others.

The concept of job enlargement did not result from the study conducted during this period. In retrospect, many of the studies indicated that specialization, when carried too far, resulted in the loss of worker effectiveness, but no definite solution to the problem was proposed. The enlargement of jobs as an aid to production was discovered by an industrial manager rather than being developed by a psychologist or sociologist, but the work that established the value of job enlargement was based, to a large degree, upon the work conducted by the pioneers of the 1920's.

V. JOB ENLARGEMENT

The term "job enlargement" reportedly was coined in 1943 by Mr. Thomas J. Watson, then president and now chairman of the board of the International Business Machines Corporation. Watson's interest began when, on a trip through IBM's Endicott, New York, plant, he noticed a machine operator sitting idle by her machine. Being somewhat amazed at the contrast between the wartime demand for speed and the obvious waste of skilled labor, he asked the reason for her idleness. She replied that she was waiting for the set-up man, and then cheerfully volunteered that she was able to perform her own set-ups but was not allowed to do so. Watson, seeing a

way to extend the hard-to-get skilled labor in his plant, decided to experiment with training all operators to do their own set-up and inspection work on their finished products. The experiment proved to be a success and the technique soon spread throughout the organization. Within five months seven departments of the Endicott plant were operating without set-up men or inspectors.

As time passed, observant management personnel began to notice changes in the reports emanating from these departments: quality of workmanship increased, the percentage of scrap dropped, absenteeism was significantly lower, production levels rose and, interestingly enough, the number of suggestions from the employee suggestion boxes tripled. On taking a closer look, management concluded that a feeling similar to the craftsman's "pride of workmanship" had developed. Watson attributed this to a feeling of more complete independence, a definite pride in being able to learn and perform new and complex tasks, and an identification with a finished product on which the worker had expended a great deal of his own personal talents and abilities.[13]

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[13]Don Wharton, "Removing Monotony from Factory Jobs," American Mercury, LXXIX (October, 1954), pp. 91-95.

The concept of job enlargement spread to other companies. Charles Walker of Harvard University, who had studied job enlargement at IBM,[14] made another investigation into its effects by interviewing a large number of production line employees at a General Motors Assembly Plant in the late 1940's and early 1950's.[15] In addition, in 1952 J. Douglas Elliott of the Detroit Edison Company carried on a study of the effects of job enlargement on clerical work, the results of which supported the IBM investigation.[16]

In 1954 Marks took an important step in the development of the theory of job enlargement by approaching his dissertation experimentation from the standpoint of overall job design rather than the specific area of job enlargement.[17] His professor and colleague at the University of California, Louis E. Davis, recognized the

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[14]Charles Walker, "The Problem of the Repetitive Job," Harvard Business Review, XXVIII (May, 1950), 54-58.

[15]Charles Walker and Robert Guest, The Man on the Assembly Line (Cambridge: Harvard University Press, 1952).

[16]J. Douglas Elliott, "Increasing Office Productivity Through Job Enlargement," AMA Office Management Series No. 134, p. 3.

[17]A. R. N. Marks, "An Investigation of Modifications of Job Design in an Industrial Situation and Their Effects on Some Measures of Economic Productivity," PhD Dissertation, Unpublished, University of California, Berkeley, 1954.

similarity between Marks' experimentation and the work of Walker and Elliott, but he also saw that it was an extension of the job enlargement theme which included the more promising field of job design theory.[18] Davis continued the development of this approach to job design throughout the middle 1950's, expanding it and building to a great degree upon the results of Marks' experimentation.[19]

In 1957 Chris Argyris of Yale University proposed that job enlargement is but one method of reducing the conflict between the individual and the business or industrial organization. Argyris was able to build more completely upon the research of other psychologists and his work can be utilized to show how their findings, the structural theory of modern organizations, and the work of Walker, Marks, Davis and others combine to give a more unified picture of the complete industrial environment.[20] Argyris substantiated his theories through a series of

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[18]Louis E. Davis, "Job Design Research," Journal of Industrial Engineering, VII (November-December, 1956), 275-282.

[19]Louis E. Davis, "Toward a Theory of Job Design," Journal of Industrial Engineering, VIII (September-October, 1957), 305-309.

[20]Chris Argyris, Personality and Organization (New York: Harper and Brothers, 1957).

industrial interviews in 1959.[21]

At the present time the concept or technique of job enlargement has not gained wide acceptance in either industrial or clerical areas of potential application. Many more firms than before are more conscious of the problems of job design, and many are attempting to learn more about employee desires and needs, but few are actively applying the principles of job enlargement per se.

In the following two chapters this paper will examine the contributions of the recorded studies dealing with the broad areas of job enlargement. The following chapter will be devoted to an investigation of Marks' dissertation, while Chapter IV will deal with the remaining work in this area. Chapter V will discuss the background psychological work which Argyris was able to draw upon, and will also include work which has not been linked with job enlargement in any previously recorded study.

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[21]Chris Argyris, "The Individual and Organization--An Empirical Test," Administrative Science Quarterly, IV (September, 1959), 145-167.

CHAPTER III

AN INVESTIGATION OF THE PRINCIPLES OF JOB DESIGN

> The underlying assumption in this approach to job design is that there is an optimum design of a job for a particular situation which will satisfy the needs of the process, producing organization, and the worker.[1]
>
> A. R. N. Marks

Perhaps the most significant investigation into the effects of job enlargement is the study made in 1954 by a graduate student at the University of California, A. R. N. Marks. The study is notable first because it is the only attempt to measure, in a controlled environment, the effect of job enlargement on various process, individual, and organizational variables, and further because it represents the first evolution from the study of job enlargement to the broader but more basic study of job design.

Marks starts by pointing out that the attempts to design industrial jobs fall into two categories: the "process-centered approach" and the "worker-centered approach." The process-centered approach, which "specifies the technical process as the most important factor

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[1]A. R. N. Marks, "An Investigation of Modifications of Job Design in an Industrial Situation and Their Effects on Some Measures of Economic Productivity," PhD Dissertation, Unpublished, University of California, Berkeley, 1954.

in the assignment of operations to workers," was developed as a result of three factors: the lack of information relating worker behavior to long term profits or costs of operation, the unpredictability of human behavior in various situations, and the inherent bias toward the inflexibility of the machine or process. The worker-centered approach, cited by Marks as being ". . . advanced by non-technical people who usually are not able to perceive the possibilities of flexibility in the technical process . . .," is based on the recognition of the personal needs of the individual worker. This recognition, according to Marks, usually results in changing working conditions rather than the work itself, i.e., by incorporating the use of rest pauses, music, bonuses, athletic leagues, etc.

Marks feels that the process-centered approach is too inflexible and that the worker-centered approach represents "an attempt to treat symptoms" and proposes his own "job-centered" approach as the natural combination of the best parts of the two.

The job-centered approach, which is discussed further in another section of this chapter:

> . . . relates to the organization of a job to satisfy the technical requirements of the work to be accomplished, the requirements of the organizational structure in which the work is being carried out, and the personal requirements of those performing the

work.[2]

Marks states that the needs of the process, organization and individual are to be met in such a way as to maximize productivity and minimize both long and short run costs resulting from the functioning of the organization.

Marks goes on to explain that the job-centered approach to job design has not been sufficiently tested and that "there is a need for further research to enable the development of an integrated theory of job design based on the job-centered approach." He then reports the existence of experimental data which were generated during the course of his investigations into the validity of the job-centered approach to job design. The remaining portion of this chapter presents the details of this investigation and its findings and considers its contribution to the body of knowledge dealing with job enlargement.

I. BACKGROUND

Marks' experimentation was carried out in the West Coast plant of a well-known manufacturer of biologicals and pharmaceuticals. The plant employed about seven hundred persons, the majority of whom were women.

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[2] Ibid., p. 11.

One department, to be known as the experimental department, was chosen for the investigation. The department was responsible for the assembly, inspection, and packing of a small hypodermic injection kit. Another department producing the same product and with a layout similar to the experimental department was chosen as a control department so that extraneous influences might be identified.

The work done in the experimental department centered around two conveyor lines which carried the parts and sub assemblies for final assembly, inspection, and packing. Because of the rigid quality demands of the industry, the sub assemblies were inspected at two points in the work cycle prior to the final inspection and testing. In addition, each worker was encouraged to set aside any part which appeared to be defective; as a consequence, over half of the rejected parts were not actually defective.

The work force in the experimental department consisted of:

1 Department Manager
2 Sub-Supervisors
1 Inspector
4 Table Workers (women)
30 Line Workers (29 women, 1 man)
1 Supply Man

Only the twenty-nine women line workers took part in the

modifications of job design. All of the workers were union members, all were hourly paid, all were listed in the Company-Union Classification Schedule in the same unskilled labor classification and all received the same hourly rate of pay.

The jobs were defined and established according to the best industrial engineering concepts and were designed to require a uniform level of skill to perform. The conveyor lines were balanced, with a total of nine operations required for the assembly, including two operations which were performed on work tables adjacent to the conveyors. The workers rotated between the jobs in a random manner every two hours; as a result each worker was proficient in each operation of the overall assembly. There was no formal training plan and new employees received little guidance from the supervisors; most of the training was done by the workers themselves in trying to help out the newcomer. Most new employees were able to keep up with the line within a few weeks.

II. DESIGN OF THE EXPERIMENT

The seven major phases of the experiment as recorded by Marks were:

1. Administration of critical response questionnaires and initial interviews.

2. The group job design (GJD).
3. The individual job design No. 1 (IJD-1).
4. Second administration of critical response questionnaires.
5. The individual job design No. 2 (IJD-2).
6. Administration of final interviews to those experiencing IJD-2.
7. Administration of self-description inventories.

Five minor phases included the presentation of the various job designs and questionnaires to the experimental and control groups.

The line job design (LJD). The original, or line, job design consisted of nine operations, seven of which were performed on conveyor lines and two of which were performed on adjoining tables. The work was belt-paced and highly repetitive, with a uniform skill requirement throughout. No attempt was made to measure individual productivity or to assign responsibility for poor quality items to particular workers.

The group job design (GJD). In the group job design all assembly operations were done by groups of four employees working together at tables. This served to eliminate the effects of conveyor pacing on performance, to establish group responsibility for quality and output, and to offer more variety, with each worker performing a

number of operations. It should be noted that the groups themselves were responsible for the organization of their own work, that is, for determining which worker performed which operation and for what period of time. More daily rotations took place during this phase of the experiment than took place during the line job design phase.

The individual job design No. 1 (IJD-1). During this phase of the work four employees were given work tables and were instructed to perform all of the operations by themselves. The first two elements of the job could not be done at the individual work tables, however, and each of the four workers took turns performing these elements at a special location.

This phase of the experiment served to measure the effect of individual rather than group responsibility for quality and for quantity of production, since each employee's work was segregated and tabulated separately. The individual workers were also responsible for obtaining their own materials and for performing their own quality checks, although these checks were later validated by the quality control inspector.

The individual job design No. 2 (IJD-2). While observing the work being done in the IJD-1 phase of the experiment, Marks discovered that certain changes should be made in order to approach more closely a controlled

environment. The IJD-1 work was being carried on in a small room adjacent to the room containing the conveyor lines but physically separated from that room. In the IJD-2 phase of the experiment, the workers performed the same operations as in the IJD-1 but they worked at the stations along the conveyor line. In addition, Marks felt that the individual workers were not spending enough time on the IJD-1; in the IJD-2 phase of the experiment the workers spent six days at each position instead of two. Productivity and quality were measured as in the IJD-1 phase.

Questionnaires and interviews. Marks was quite interested in identifying the specific areas of behavior which led to any changes in productivity or quality standards. In an attempt to make a positive identification of this type he administered two sets of critical response questionnaires and self-description inventories and held structured and non-structured interviews after various phases of the experiment.

The critical response questionnaires were administered to the experimental group and to the control group before the actual experimentation began. The questionnaires were composed of open-end type questions designed to determine what was important to the person being questioned and also how important each was,

relative to the other items. The first set of questionnaires was administered to the experimental group and to half of the control group, while the other half of the control group participated in personal interviews. At the end of this period, but prior to the experimentation period, the first half of the control group was interviewed while the second half received the questionnaires. This involved method of testing was utilized to determine whether or not the questionnaires adequately reflected the results of the interviews. Marks felt that the interviews, though technically more thorough, were too expensive and time consuming for this particular experiment. In this case, it should be noted, the interviews were structured, using the questionnaires as an interview schedule.

The same critical response questionnaires were administered to both groups following the IJD-1. The intention here was to establish the measure of outside influences by comparing the response of the control group to this questionnaire with the same group's response to the original questionnaire.

After the IJD-2, Marks decided to probe more deeply than either the questionnaires or general interviews had done. Accordingly, the sixteen workers who had participated in the IJD-2 were given intensive, two-hour interviews by skilled interviewers with the objective of

obtaining specific information on the response of the employees to the various job designs.

Self-description inventories were administered to both groups following the experimentation period. The inventory, developed by Ghiselli, was designed to measure supervisory ability, occupational level, initiative, masculinity-femininity, intelligence, maturity, self assuredness, work versus person orientation, ego versus support, personal versus social orientation, objective versus subjective orientation, and practicality.

Time phasing. Because of different sample size requirements for statistical analysis, the different phases of job design were not equal in length. The line job design was observed for twenty-six days in order to obtain preliminary information; the group job design lasted fourteen days, individual job design No. 1, sixteen days, and individual job design No. 2, twenty-seven days.

III. RESULTS

In order to evaluate the results of Marks' experimentation, the underlying hypotheses and the methods of testing them must be reviewed. Marks hypothesized that:

1. Higher economic productivity will result from a modification of work content of a job in the direction of increasing the number of assigned tasks which
   a. are similar in technological content and

skill requirements.

b. are of a dissimilar nature.
c. are sequentially related in the technical process (as opposed to functionally related).
d. involve the final activities in the process, in a sub-process, or in the turning out of independent parts.
e. involve added responsibility for the fabrication of a product or part, or the accomplishment of a task. Added responsibility implies an enlargement of the jurisdictional area within which decisions are made. A larger scope of decision making might entail:
   i. the addition of certain specified tasks or operations which require decisions to be made on preconceived work content, e.g., an inspection operation in which a decision is made on whether a performance has been proficiently accomplished. Other operations providing a similarly increased scope of decision making include set-up, machine adjustment, etc.
   ii. broadening of the specification limits which have been set on various operations, e.g., allowing the worker to choose his own immediate production rate, etc.

2. Higher economic productivity will result from a modification of work content of a job permitting the worker increasingly to perceive the relationship of his contribution to the fabrication of the product or the completion of the process. This may be accomplished by locating all the operations of the process in a single work area, thereby enabling the workers to observe the process in its entirety.[3]

These hypotheses were tested by modifying the job design and evaluating changes in productivity, in quality, and in the attitudes of the workers.

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[3] Ibid., pp. 17-18.

The changes in productivity resulting from the modification of the job were relatively easy to measure, since completed and partially-completed units were tabulated for each individual in the IJD-1 and IJD-2 phases and for each sub-group in the GJD phase. Productivity per man hour under the original line job design was also measured under the conditions existing during the experimental period.

Quality was somewhat harder to measure but measurement was made feasible through the use of various indices which had been established in order to obtain more detailed quality data. A discussion of the various quality standards and methods of evaluation is contained in a later portion of this chapter.

The measurement of the changes in attitude of the workers was dependent upon the evaluation of the questionnaires and structured interviews administered prior to, during the course of, and following the experimental phases. The response to these interviews and questionnaires and the relationship of the response to other elements of the job is also discussed in the latter portion of this chapter.

The conditions satisfying both hypotheses are to be found in the individual job designs 1 and 2. The similar technological and skill requirements result from

each worker performing each operation involved in assembling the completed kit. The dissimilar nature of the job resulted from the fact that each worker was required to obtain her own supplies and to perform some operations apart from her work table. The operations were performed in an approximate sequential nature in the assembly process, and the process was carried through to completion. An added responsibility for quality and increased individual responsibility for quantity resulted from the utilization of the IJD-1 and IJD-2 designs. Finally, the satisfaction of seeing the cradle assemblies packed into the cartons was instrumental in allowing the worker to "perceive the relationship of her contribution to the fabrication of the product."

Productivity and quality results. Productivity was measured as a percentage of the original design, or LJD. As it was necessary to use both individual productivity data and group productivity data, the final unit of measure decided upon was the number of kits produced per person per hour, calculated by dividing the total output of the group by the number of individuals comprising the group. Partially completed kits which remained at the end of each day were added to the number of finished kits by weighting each sub assembly in terms of the time taken to assemble it as compared to the total time taken

to assemble the entire kit. The productivity index, or percentage of the productivity observed for the LJD, was calculated for each phase of the experiment.

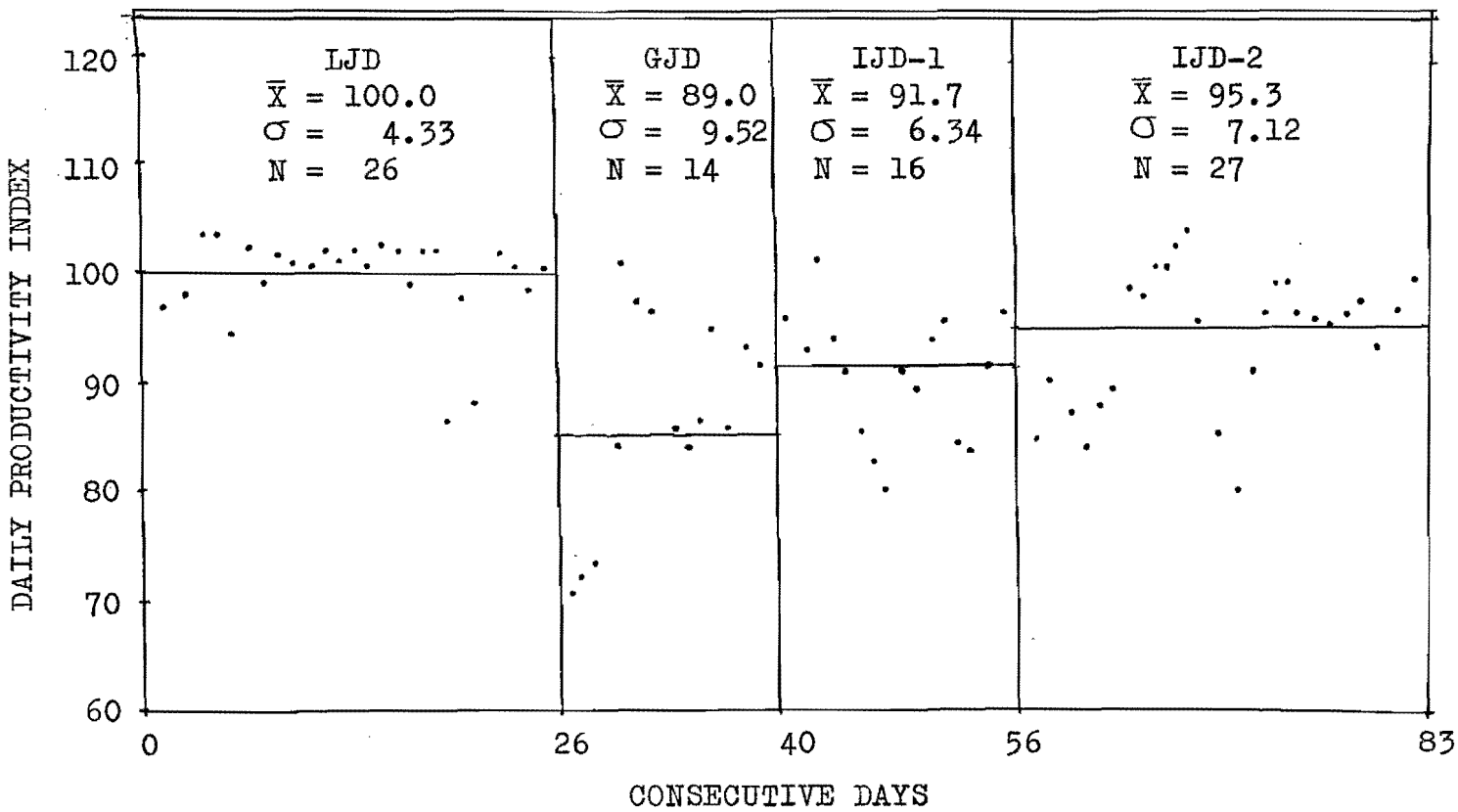
Table I shows the productivity index for each day of the experimental period and the average for each job design. The average productivity index ranged from 89.0 for GJD to 95.3 for IJD-2.

In general, the average daily productivity index was less than 100 for each experimental design but was climbing steadily toward the end of the experiment. It should also be noted that the productivity of the workers performing on IJD-2 was a direct function of the time spent on the job, with the average productivity index of the first day being 89, as compared to the average productivity index of 101 for the sixth day.

Changes in quality were measured by using two indices. The first index resulted from the utilization of the sampling plan then in use by the company, and consisted of visual inspection for both major and minor defects which resulted from improper assembly or handling. The index was computed by weighing the different categories of defects in accordance with what each individual industrial consumer had designated to be of prime importance in his Acceptable Quality Level requirements. Inspections were made at two points in the cycle and two

TABLE I

DAILY PRODUCTIVITY INDEXES FOR THE FOUR JOB DESIGNS



sets of data resulted. These sets of data, designated as BSI (Before Sterilization Inspection) and ASI (After Sterilization Inspection), are summarized in Table II.

The second index resulted from a count of kinked assemblies. The product was constructed in such a manner that a small plastic tube was an integral but vulnerable part of the internal mechanism; the kinking or twisting of this tube was a common defect and necessitated a re-assembly of the apparatus. Marks was able to obtain an accurate count of the number of these kinked assemblies and, by calculating the percentage of kinked assemblies in each production lot, used this percentage as a second quality index. This index is summarized in Table III.

In general, the improvement in quality from one design to the next was much more dramatic than the improvement in production levels. As shown in Table II, the average BSI index decreased from 4.17 for the LJD to 1.55 for the IJD-2. The average index for the ASI decreased from 2.42 to 1.35 for the same job designs. Table III shows that the average percentage of kinked assemblies dropped from 0.72 per cent for the LJD to 0.18 per cent for both the IJD-1 and IJD-2.

Interview and questionnaire results. The critical response questionnaires were used to find out what job

TABLE II

COMPOSITE INDEXES OF AQL WEIGHTED DEFECTS FOR THE FOUR JOB DESIGNS

INSPECTION	STATISTIC	LJD	GJD	IJD-1	IJD-2
BSI	$\bar{X}$	4.17	3.52	2.14	1.55
	σ	3.91	4.40	2.63	2.22
	N	60	16	14	26
ASI	$\bar{X}$	2.42	3.11	2.27	1.35
	σ	3.23	4.63	2.39	1.45
	N	60	10	8	13

TABLE III

PERCENTAGE OF KINKED ASSEMBLIES FOUND IN CONSECUTIVE INSPECTION LOTS FOR THE FOUR JOB DESIGNS

STATISTIC	LJD	GJD	IJD-1	IJD-2
$\bar{X}$	0.72	0.49	0.18	0.18
σ	0.41	0.25	0.07	0.11
N	55	4	8	13

factors, such as work content or supervision, were important to the workers. The questionnaires were given before the investigation (Questionnaire No. 1), after the workers had experienced LJD, GJD, and IJD-1 (Questionnaire No. 2) and after the investigation had been completed (Questionnaire No. 3). Personal interviews were used to evaluate and supplement these questionnaires.

In addition, self-description inventories were used to obtain comparative measurements of personality traits and to determine if any relationship existed between the traits and the response to the job designs. The traits were also compared with the productivity and quality records of the individual employees. The results of these comparisons are summarized in Table IV. The morale index was established on the assumption that the balance between the positive and negative responses to the critical response questionnaire gave an "indication of 'morale'."

Marks notes four commonly recurring attitudes which were expressed during the interviews and which appeared on the questionnaires:

1. The enforced pacing of the conveyor belt was mentioned unfavorably.
2. The subdivision of work was mentioned favorably for the LJD but making the whole unit was

TABLE IV

RELATIONSHIPS AMONG FACTORS

FACTORS	Productivity †	Quality (Kinks) †	Quality (Q_{AQL}) †	Productivity ††	Quality (Kinks) ††	Quality (Q_{AQL}) ††	Like LJD	Like GJD	Like IJD	Morale	Increase in morale
Like LJD	0			0	-A	-A				0	-S
Like GJD				0	0	-A				0	0
Like IJD	0	-S	0	+A	+A	+A				0	+A
Morale				0	0	0	0	0	0		0
Increase in morale				0	0	0	-S	0	+A	0	
Maturity	0		+A	-S	0	0	0	0	0	+A	-A
Intelligence	0		0	0	0	0	0	0	0	-A	0
Masculinity	0		0	0	0	-S	0	0	0	0	0
Initiative	0		0	0	0	0	0	0	0	0	-A
Supervisory ability	0		0	-S	0	0	0	0	0	0	-A
Occupational level	0		-A	0	0	0	0	0	0	+A	0
Self assuredness	0		0	-A	-A	0	0	0	0	0	+A
Work orientation	0		0	0	0	-A	0	0	-A	0	0
Ego	+A		-A	0	0	0	+S	+A	+A	0	0
Personal orientation	0		0	+A	0	0	0	0	0	0	0
Objective orientation	-S		0	0	0	-A	0	+A	-A	-S	0
Practicality	-S		0	+A	+A	0	0	0	0	-S	-A

† For Adjustment Period (IJD-1)
†† For Adjusted Period (IJD-2)
S Significantly Related (5% Level)
A Appears Related
\+ Positively Related
\- Negatively Related
0 Does Not Appear Related
Blank Spaces Indicate That No Analysis Was Performed

mentioned favorably for the IJD-2 by many of the same people.

3. The added responsibility for quality and production under IJD-1 and IJD-2 was mentioned favorably.
4. The knowledge of individual production levels and quality levels was also mentioned favorably for the IJD-1 and IJD-2.

In general, the response to the questionnaires substantiated Marks' original hypotheses. The elements that he felt would bring a positive response by the workers were, for the most part, mentioned favorably throughout the investigation.

IV. DISCUSSION OF RESULTS

Marks prefaces his discussion of results with a qualifying statement, pointing out that the experiment quantitatively measured only productivity and quality, while leaving unmeasured, or only qualitatively measured, such factors as turnover, absenteeism, process flexibility, control efficiency, scrap count, etc. For this and other shortcomings of the experiment, he lays the blame on a lack of sufficient time, i.e., a scarcity of experimental data. He states:

Because of insufficient experimental time,

> qualifications must be placed on generalizations resulting from this investigation. If the full effects of modifications of work content are to be found in a particular situation, it would appear necessary to have an experimental period extending well past the learning and adjustment period.[4]

Of the two factors measured, productivity and quality, Marks felt that the higher gains made in level of quality were due to the stressing of high quality levels of management. Indeed, in the past, productivity had been established by the speed of the conveyor belt.

An interesting sidelight to this concerns the workers' somewhat negative attitude toward increases in productivity. Marks noted that many workers complained during personal interviews of "rate busters" and only ten per cent of the workers were willing to have their productivity results posted on the bulletin board, as opposed to eighty-five per cent who were willing to have the previous day's quality results posted. Significantly, Marks points out that more participation by the workers in job design and in production standards might have alleviated this situation.

In discussing the response to questionnaires and to the interviewer's questions, Marks notes, interestingly enough, that no apparent change in attitude resulted from

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[4] Ibid., p. 122.

the exposure of the experimental group to the individual job design as opposed to the group job design. A difference in attitude was noted in the experimental group as opposed to the control group, however, when the entire experimental period is considered. Marks notes, in the experimental group, a more favorable response to the rate of working, amount of fatigue resulting from work, and individual responsibility. He does not point out where in the experimental period this shift occurred.

Marks seems to be cognizant of the personality differences which may or may not affect productivity. He has this to say about these differences, and about morale:

> Although there is some indication that a relationship exists between attitude and performance on a particular job design, further research must be undertaken before any generalizations can be made. In any event, there was no indication that a relationship between performance and change in morale existed. Again no generalizations can be made; however, it may be hypothesized that there is less chance of obtaining higher performance on the job by improvement of morale in the manner usually attempted, e.g., music, social activities, welfare benefits, than by improving morale through developing a more favorable attitude toward the job. The thesis here is that only that portion of morale relating to attitudes towards the design of job is in turn related to performance on the job. This hypothesis is further strengthened by an analysis of the characteristics of the workers which provided some indications as to why there was a change in attitude. It was found that workers with a favorable attitude towards the individual job design had personalities indicating that they were subjective and/or person oriented. Also, individuals who appeared to have these same personality traits produced the highest

quality product. Thus it may be hypothesized that through effective job design it is possible to satisfy those needs of workers which are described by personality traits which in turn are related to organizational goals, viz. high productivity and high quality. The satisfaction of such needs will result in an improved attitude towards work content and improved performance.[5]

In evaluating Marks' work, Professor Louis E. Davis points out that we do not have answers for three fundamental questions, either as a result of this work or previous work. The questions are:

1. What influence does job design have on effectiveness of an individual's performance as measured by productivity, quality, long term costs, satisfaction, morale, etc.?
2. What are the most effective methods of achieving optimum performance? This requires a consideration of the methods of design and specification of jobs, as compared with the methods of palliating the effects of given designs by various means internal and external to the content of one job itself. The effectiveness of job design methods must be compared with the alteration of factors external to the physical job, such as human relations programs, supervision and leadership, incentives, etc.
3. Can a theory of job design be developed and, if so, can it be expressed in the form of guides and principles that can be used by engineers, personnel people, supervisors and managers? Satisfying this need will require a comprehensive research program, concerned with:
   a. The nature of job content as related to job performance, to aspiration, to perception of the individual's role in the organization.

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[5] Ibid., pp. 137-138.

b. The interrelationships between the technical, organizational, and personal requirements of each job.
c. An evaluation of organization design theories and methods as related to technical and personal requirements for effective performance on jobs.
d. An evaluation of technical production theories and methods as related to organizational and personal requirements for effective performance on jobs.
e. An evaluation of the effectiveness of manipulating factors internal and external to job content and the boundry limitations of each.[6]

In another report Davis states:

> A new criterion of total economic costs is needed. . . . This is the total cost of producing a unit of product. In addition to the immediate charges for labor, materials, overhead, and so on, it includes the relevant long term charges for economic, engineering, organizational, social, psychological, and physiological costs. A new job-centered approach to job design must be used.[7]

Marks' experimentation shows shortcomings in two major areas: measurement of intangibles, and the length of the experiment.

Measurement. Davis notes very carefully that any new theories of job design must take long-term as well as short-term costs into consideration; indeed, he remarks

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[6]Louis E. Davis, "Job Design Research," Journal of Industrial Engineering, VII (November-December, 1956), 275-282.

[7]Davis, "Job Design and Productivity--A New Approach," Personnel, XXXIII (March, 1957), 430.

that the failure to do this is the reason job design must be re-evaluated. In view of this, it is interesting to note that Marks was either unprepared or unable to make any quantitative measurements of the actual cost per unit of turnover, absenteeism, work suppression, etc. It would seem that little progress has been made toward the problem of the worker arbitrarily restricting output, a problem which was observed in the Hawthorne Studies more than thirty years ago.

Length of the experiment. Marks states that the lack of sufficient time to gather data certainly affected the conclusions that could be drawn, particularly with respect to statistical levels of confidence. He did not comment on the work of investigators who have theorized that the latent dissatisfaction caused by highly repetitive, machine-paced work may not make itself known for a period of years rather than days. Walker[8] points out that one reason for dissatisfaction on the automobile assembly line is the realization that the door is closed to advancement to a job requiring higher skills; it is difficult to see how an investigation lasting four or five weeks can properly evaluate a change or lack of

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[8]Charles Walker and Robert Guest, The Man on the Assembly Line (Cambridge: Harvard University Press, 1952).

change in an attitude such as this. Turnover is another factor that cannot be measured in a short period of time; surely a record of at least a year should be taken into consideration in order to evaluate a change in job conditions with respect to layoffs or voluntary severances.

V. RELEVANCE OF THE STUDY

Marks' investigation is perhaps the one most important piece of work in job enlargement to date. It enjoys this preeminence for two reasons: first, it is the only study which entailed actually changing the design of a job to see what effect this would have on certain factors, and which at the same time kept track of the results of a control group to evaluate extraneous influences. Secondly, it secured a quantitative measure of the change of two of the factors which job enlargement is expected to affect: productivity and quality.

It seems strange that two considerations as basic as these should raise one investigation above all others, but the truth is that no other investigation has included both of these aspects and indeed, most include neither.

Marks' work, then, is an effective guide to show what must be done, but it, too, is lacking in some

areas, as was pointed out previously. Davis' concept of a job design based upon a consideration of both long- and short-term costs has not even been approached in serious investigation. It is expected that the true value of Marks' work will be in bridging the gap between the inconclusive work that has gone before and the more extensive investigations which may be expected to follow.

CHAPTER IV

CASE STUDIES IN JOB ENLARGEMENT

"You can't beat the machine. Sometimes the line breaks down. When it does, we all yell 'Whoopee'! You can hear it all over the plant."[1]

Automobile Assembly Worker

In contrast to the serious scarcity of data from controlled experimentation studies, a significant amount of information has been obtained from case studies dealing with job enlargement. The danger of drawing broad conclusions from case studies has been pointed out previously; however, the data gathered will be presented and its proper place in the bulk of information dealing with the subject will be evaluated. This paper outlines the approach and results of each study, indicating those cases where contradictions occur, and summarizing the section on historical data by discussing the relevance of the case studies in total.

The initial investigation in the area of job enlargement by IBM has been briefly touched upon in the second chapter of this paper. In his report dealing with

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[1]Robert Guest, "Men and Machines," Personnel, XXXI (May, 1955), 496-503.

the investigation, Walker pointed out that the results were significantly influenced by the unique conditions which existed in the company immediately following the war and that the conclusions are not necessarily applicable to all corporations or in all situations. He proposed that each of the following conditions must be met if the enlargement of jobs is to result in increased product quality or decreased labor cost:

1. Company policy must be flexible enough to permit it. IBM was undertaking a general housecleaning at the time the program was started, and most of the reluctance to change had been broken down.
2. The demand for a quality product must be high.
3. The company must be in an expanding market in order to absorb the displaced personnel.[2]

Walker noted that he did not feel that job enlargement was applicable to an assembly line operation.

Don Wharton,[3] in writing of the IBM study, describes some of the newly enlarged jobs in detail. The new punch press operator, upon being assigned a job, now examines blue prints, determines what cutting tools are needed, sets them up in the press, checks the first few parts with the appropriate gauge, and makes the necessary adjustments on his machine. Wharton points out that the

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[2]Charles Walker, "The Problem of the Repetitive Job," Harvard Business Review, XXVIII (May, 1950), 54-58.

[3]Don Wharton, "Removing Monotony from Factory Jobs," American Mercury, LXXIX (October, 1954), 91-95.

operator now has complete responsibility for the quality of his product.

He goes on to tell of the team of girls wiring electric calculator panels, boards about eighteen inches square with a maze of multi-colored wires. The team was previously organized with one girl wiring a certain portion of the board, perhaps the yellow and black wires, and then passing it to another, who might then add the green and white wires. Individual incentives to higher quality or greater output were not utilized. Wharton points out that the adoption of the new system, in which each girl wires a complete panel, has resulted in both increased quality and impressive changes in employee morale and pride of workmanship.

Wharton concludes his report by quoting one of IBM's competitors, L. C. Stowell, then president of the Underwood Corporation:

> I have seen for myself IBM's work in job enlargement, and am favorably impressed. The basic principle of enlarging the worker's job and thereby increasing his interest in his work is fundamentally sound. There are some factors which may prevent many industrial firms from undertaking wholesale job enlargement, but the results are so advantageous that I believe job enlargement poses an interesting challenge to every business and industrial firm.[4]

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[4] Ibid.

In 1955, after a period of twelve years had elapsed since Mr. Watson's first detection of a serious personnel problem, Mr. D. L. Bibby, then vice president of IBM, addressed a meeting of the Texas Personnel and Management Association. Mr. Bibby related that IBM had continued to use the job enlargement concepts and that the first impressions of the tool--that it was of important but limited value--had underestimated its potential applications. Mr. Bibby pointed out that the value of job enlargement lay not in its techniques or methods for job design but in the important truth that it emphasized and continually called attention to: the human element must be taken into consideration, whether we are designing machines, tasks, processes, or entire organizations.

One of Mr. Bibby's observations should be noted:

> A job enlargement program such as we undertook is not something that can be done overnight. On the contrary, it takes just as much thought and effort to enlarge a job as it did to reduce it in the first instance under job specialization techniques.[5]

Wharton, Bibby and Walker do not list any definite techniques which IBM worked out in establishing their job

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[5]D. L. Bibby, "An Enlargement of the Job for the Worker," Proceedings, Texas Personnel and Management Association, October 21-22, 1955 (Austin--University of Texas), p. 31.

enlargement program. From all appearances, the only criteria established in enlarging a job were

1. To add to the number of tasks performed,
2. To add to the responsibility for quality or production or both, and
3. To add to the feeling of accomplishment or pride on the part of the worker.

As it was pointed out in Marks' paper and as it will be shown when later investigations are examined, the job design criteria based upon job enlargement can be somewhat more sophisticated and may have considerably greater depth than those expressed above; whether this materially affects the success or failure of the design is a question that will be discussed but which at present cannot be answered with any degree of confidence.

The IBM program was undertaken at a time of unparalleled industrial expansion. Wages were increasing, consumer goods were plentiful, and industrial conditions in general were improving rapidly. What would have been the worker's response if IBM had installed job rotation? Or music? Or even industrial bowling leagues? These questions, upon which the final analysis of the true value of job enlargement depends, are unanswerable. For this reason, as well as others, the IBM investigation must be recorded as giving only an indication, not

conclusive proof, that job enlargement may increase employee job satisfaction, raise quality levels, and permit better utilization of skilled manpower when applied to selected repetitive jobs.

The second and probably best known of case studies was the General Motors assembly line investigation carried on by Charles Walker and Robert Guest of Yale University in 1949. A team of interviewers from the Yale Institute of Human Relations spent a number of months in an automobile assembly plant questioning one hundred and eighty men about their pay, working conditions, supervision, etc. The results mirrored Walker's previous investigations at IBM and further strengthened his argument for job enlargement as a job design policy.

The interviews were well designed and included both open-end and question and answer approaches. The jobs were not all production line jobs but were distributed in the following manner:

	No. of Men	% of Total
Main Assembly Line	86	48
Sub Assembly on a Moving Belt	28	16
Sub Assembly not on a Moving Belt	38	21
Repairmen	14	8
Utility Men	11	6
Other	3	1
Total	180	100%

Walker and Guest quote some of the respondees

directly:

> If I could do my best I'd get some satisfaction out of working, but I can't do as good work as I know I can do.
>
> You're just a number to them. They number their stock and they number you.[6]

From a repairman, who had a constantly varying job:

> I never let a car go by with my number on it unless it is done right.

A contrasting statement from an assembly line operator in the same department:

> On an assembly line you just do it once; if it's wrong, you have no time to fix it. I get no satisfaction from my work. All I do is think about all the things that went through wrong that should have been fixed.[7]

The difference with respect to job satisfaction between the assembly line employees' jobs and the more varied jobs of the repairmen and utility men was marked. Significant differences were also reputedly detected among those workers on the assembly and sub assembly jobs who had more than one operation to perform. The question was asked, "Would you say your job is very interesting, fairly interesting, or not at all interesting?" The results were correlated with the number of

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[6]Robert Guest, "Men and Machines," Personnel, XXXI (May, 1955), 496-503.

[7]Charles Walker and Robert Guest, "The Man on the Assembly Line," Harvard Business Review, XXX (May-June, 1952), 71-83.

operations performed as shown below:[8]

Operations Performed	Number of Respondees Indicating	
	Very or Fairly Interesting	Not at All Interesting
1	19 (33%)	38 (67%)
2-5	28 (44%)	36 (56%)
5 or more	41 (70%)	18 (30%)

In commenting on the results of this particular line of questioning, the two writers state:

> To one unfamiliar with assembly line work experience, the difference between a job with five operations and one with ten, or between a job taking two minutes to perform and one taking four, might seem far too trivial. Our data have shown this is not true . . . The point may be given an oversimplified summary by saying: other things being equal, the difference between a satisfied and a dissatisfied worker may rest on whether he has a five-operation or a ten-operation job.[9]

Guest noted later that a very important factor which had an effect upon job satisfaction was the apparent lack of any upward mobility. Most of the jobs required about the same amount of skill to perform and the only advancement was to foreman, a position which only five per cent of the working force would ever attain. Many of the men questioned responded that the only way to advance was to quit.[10]

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[8]Ibid.

[9]Charles Walker and Robert Guest, The Man on the Assembly Line (Cambridge: Harvard University Press, 1952), p. 152.

[10]Robert Guest, "Men and Machines," Personnel, XXXI (May, 1955), 496-503.

Walker and Guest concluded from their data that the repetitive nature of the jobs and the mechanical pacing of the conveyor belt contributed most to the general feeling of dissatisfaction. They noted that the workers on the assembly line were much more discontented with their work than the utility men or repairmen who were shifted from job to job.[11] Their solution to the problem consisted of combining job enlargement with job rotation by changing the basic design of the jobs and by rotating the workers among the more repetitive jobs on a systematic basis. In discussing the enlargement of the jobs they point out:

> Job enlargement in the sense that we suggest it does not mean turning automobile assembly back into the hands of master mechanics with one worker assigned to the assembly of one car. It does mean paying more attention to psychological and social variables in the determination of time cycles, and, by the same token, paying more attention to the content of individual jobs.[12]

The study conducted by Walker and Guest was, in reality, only conclusive with respect to the attitudes of certain workers toward repetitive work. No attempt was made to measure productivity or quality and a control

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[11]Charles Walker and Robert Guest, "The Man on the Assembly Line," Harvard Business Review, XXX (May-June, 1952), 71-83.

[12]Ibid.

group was not established. Cause and effect are not clearly defined and no attempt was made to see if increased job satisfaction brings about higher productivity, decreased turnover, or any of various other measurable effects. The study was valuable in setting forth the typical production worker's outspoken dislike of repetitive work, however, and was, for its day, a pivotal study of job design.

Job enlargement was first conceived as a tool for enhancing job satisfaction in the factory; the first reported use of the technique in an office was reported by the Detroit Edison Company in 1953.[13] J. Douglas Elliott, then supervisor of the Customers Billing Department, had read of job enlargement techniques being used at IBM and felt that these same concepts could be applied to repetitive clerical work. He began by having a group of clerks do quality checks on the utility bills that they were printing. Previously, a team of employees had screened each bill for errors prior to mailing, and many printed bills had to be rejected or corrected. Within a few weeks after the change was made the quality of the

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[13]J. Douglas Elliott, "Increasing Office Productivity Through Job Enlargement," in AMA Office Management Series Number 134, 1953, pp. 3-15.

work had improved significantly and continued to improve for months. It was apparent that the clerks took more pride in their work and were eager to accept the greater responsibility.

Elliott then turned to a team of three girls whose job was to post and print running totals of customers' accounts. One girl did the posting work and printed the results, another checked the first girl's work, and a third ran a further check by computing totals and balancing one against the other. The three jobs were combined, with each girl checking her own work, and quality again increased.

Elliott continued to seek out means of applying job enlargement to repetitive work, and also tested other approaches, including rest pauses and music. The other efforts were suspended, however, when it was discovered that absenteeism was twenty per cent higher in repetitive jobs than in semi- or non-repetitive work.

He then made an informal survey of a group of public and private utilities similar to Detroit Edison. Out of 122 firms responding, he found that the organizations which practiced extreme specialization of labor had significantly higher long-range costs than those which had a lesser amount of specialization. He himself justified job enlargement's use only in terms of decreased

cost, stating that ". . . it does not increase costs, or if it does, it should be abandoned."[14]

Elliott lists the three objectives of any job enlargement program as being (1) to relieve job monotony, (2) to utilize employees' capabilities to a greater extent, and (3) to eliminate duplication caused by excessive specialization. In reporting on the problem, Baird lists the results as including a higher average wage for the employees affected, overtime reduced fifty per cent, absenteeism reduced fifteen per cent, the number of job classifications significantly reduced, and one full day cut off the schedule of setting up new accounts.[15]

Elliott sums up his findings by stating:

> I think of this whole area of specialization versus non-specialization as a pendulum which, at the turn of the century, stood near the one extreme of non-specialization. Today, with all our specialized procedures, it stands near the other extreme. I think of the ideal position of the pendulum as being somewhat short of the latter extreme. I think of the job-enlargement philosophy as the means of finding the notch along the periphery of the swing into which the pendulum should fall to gain the ultimate in production.[16]

Elliott's work has again proven the general worth of the

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[14]J. Douglas Elliott, "Increasing Office Productivity Through Job Enlargement," in AMA Office Management Series Number 134, 1953, pp. 3-15.

[15]Dwight G. Baird, "How Job Enlargement Cuts Absenteeism and Overtime," American Business, XXIV (July, 1954), 10-12.

[16]Elliott, loc. cit.

job enlargement approach under conditions of extreme specialization, but again the lack of any type of comparative control group must render the quantitative results of the study subject to outside influences. It should be noted, however, that in the intervening years the Company has continued to apply the job enlargement philosophy and has not encountered any severe set-backs or found any errors in the general theory of reducing labor specialization.[17]

Another reported application of job enlargement techniques further strengthens the argument for the usefulness of the concept in the office environment. A life insurance personnel director, Mr. Edward A. Robbie of The Equitable Society, redesigned the work of a group of file clerks working in the home office administration department. Routine filing had previously been done by thirty-eight employees who were organized into three groups to perform the separate operations of checking, classifying and filing the reports. By utilizing part time college employees and giving each clerk the responsibility for all three functions, the number of equivalent permanent employees was reduced to thirty-four. Other

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[17]Personal Correspondence, Mr. J. D. Elliott, January 17, 1961.

departments were able to reduce clerical labor in similar jobs by redesigning the tasks. In addition, the permanent employees, who were now enjoying higher pay and more responsible positions, were averaging forty-two per cent less turnover.[18]

It is interesting to note the use of part time college help in somewhat menial, repetitive work. Robbie reports that most of the students welcomed the opportunity to "unwind" from their intensive study periods by performing work which required little or no original thinking.[19] This attitude, though quite logical, contrasts with the popular view that the more intelligent personnel desire challenging and creative work. It is doubtful, however, that any of the students employed at such menial tasks would choose a file clerk's position as a lifetime career.

A similar office application of job enlargement techniques was reported by Robert Guest. Clerks in the Underwriting Department of Colonial Insurance Company, East Orange, New Jersey, had been experiencing a forty per cent turnover rate over a two year period. The

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[18]"Says Job Enlargement Relieved Dull Work for Equitable File Clerks," National Underwriter-Life Insurance Edition, LXI (February 15, 1957), 10.

[19]Ibid.

major point of contention seemed to be the subdivision of the work of receiving, filing, and processing applications, a job which had been given to three different groups of girls organized as Application Set Up, Application Control, and Application Suspense. In a move similar to the Detroit Edison work, the jobs were combined and each girl given the responsibility for the entire cycle from incoming mail reception to final mailing of the policy; in addition, the girls were given the title of "Application Control Clerk." After the change was effected, turnover fell off to almost nothing, quality doubled, and the flexibility of the working force made it possible for any girl to fill in for an absent colleague. Guest reports that job satisfaction appears to have increased significantly.[20]

Although the results are indicative of success, the lack of any means of control makes generalizations impossible for this investigation as it has with so many of the others in the past.

It is interesting to note that job enlargement techniques have also been utilized in the job lot industries. Broadly defined, job lot work is work that

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[20]Robert Guest, "Job Enlargement--A Revolution in Job Design," Personnel Administration, XX (March-April, 1957), 9-17.

produces "custom made" products, as opposed to the mass produced product which usually calls for a maximum number of repetitive tasks. In one case, the jobs which were enlarged belonged to a group of fifteen welders at the Portland (Maine) Copper and Tank Works. These welders were highly specialized, as is common for craftsmen of this type, with eight welders working solely on manual arc welding jobs, five on jobs requiring inert gas welding, and two on automatic welding machines.

The situation caused problems in the balanced scheduling of work, trying to keep each group busy without overloading anyone, and also caused the normal amount of bickering and cliqueishness among the men. To alleviate these problems the welding supervisor hit upon the idea of training each of the men, in groups of two and on a personalized basis, to do all three types of welding. The results went farther than just the expected new ease in scheduling--although this change alone brought a twenty per cent increase in production--but improved quality was reflected in a decreased number of rejects, the welders themselves commented that they were much more pleased with their jobs, and turnover actually ceased--"no quits or fires among welders in twenty-seven months."[21]

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[21]"Turning Operators into Mechanics," Factory

Needless to say, the changes were not carried out in a clinical atmosphere, as indeed none of the changes since Marks' work had been. It is interesting to note that each welder is now set up in an individual welding booth as an independent craftsman and carries the title of "mechanic" instead of "operator." This type of change, which is not within the generally accepted scope of job enlargement, would probably have had some influence on production, quality, job satisfaction, and turnover. It is the lack of a quantitative measure of this influence which affects the value of the data and precludes drawing any broad conclusions.

Comments by two other industrial spokesmen are relevant here. Reporting in Iron Age in 1956, G. J. McManus gave warning of possible union dislike for job enlargement practices. McManus points out that:

> Enlarging jobs means changing pay and labor classifications, and there's no blinking at the fact that many unions are suspicious of company actions in these areas.[22]

He proposes no solution to the problem except educating the men and informing the union of any changes prior to the date of execution.

Management and Maintenance, CXIII (December, 1955), 106-7.

[22]G. J. McManus, "Job Enlargement is Worth Checking," Iron Age, CLXXVII (February 23, 1956), 52.

A second article in Occupational Hazards in 1954 cited job enlargement as a potential safety tool. The concept advanced was that the increased interest in the job generated by the job enlargement design would also keep a worker more alert and make him concentrate on his job more closely, and so tend to prevent accidents caused by daydreaming and inattention.[23]

It is important to note that these two comments bring into focus the fact that there are subtle factors under the surface which must be taken into consideration when investigating the effects of job enlargement practices on the industrial or business environment. Chapter V contains an evaluation of many of these factors.

The utilization of job enlargement techniques in retail selling has also been recorded. A group of variety store salesgirls were given full responsibility for choosing and buying their merchandise, organizing their sales counters, and designing and constructing their displays. The job, which previously had consisted of supervising the activities of a group of salesclerks, now became one of running a miniature store with unlimited possibilities for originality and initiative. The

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[23]"Job Enlargement--A Safety Tool?" Occupational Hazards, XVI (August, 1954), 21.

employees were quite pleased with the change: turnover and absenteeism reduced dramatically, and labor problems became almost nonexistent. Sales figures were not published but indirect expenses caused by duplication and delay decreased substantially.[24] In passing, it would be interesting to compare this approach with the classic Sears and Roebuck plan of decentralization which effectively pushes decision making and control far down into the lower levels of management. James C. Worthy of Sears states:

> We have found that where jobs are broken down too finely we are more likely to have both low output and low morale. Conversely, the most sustained efforts are exerted by those groups of employees who perform the more complete sets of tasks . . . and these likewise exhibit the highest levels of morale and esprit de corps.[25]

A report published in 1954 points up the fact that hospitals, in their attempts to care for the increasing number of in-patients and faced with the necessity of using new and complex apparatus and treatments, have turned to specialization in their nursing care. A large municipal hospital had made an attempt to organize the

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[24]Herbert Krugman, "Just Like Running Your Own Little Store," Personnel, XXXIV (July-August, 1957), 46-50.

[25]From a paper given by J. C. Worthy at the 45th Annual Meeting of the American Sociological Society, New York City, December 29, 1949.

nursing work load by making each nurse responsible for one particular portion of the care of the hospital's patients, with the result being that one girl might give a certain number of injections in one day, another so many transfusions, while a third might have the responsibility for preparing a number of food trays. The report goes on to state that in applying job enlargement techniques, teams of nurses are given a certain number of patients to care for, with responsibility for their complete nursing care. As a result of this change, the efficiency and productivity of each nurse has doubled. Marion Alford, Director of the Hospital Division of the National League for Nursing, is quoted as saying, "Individualized care is better for the patient and greatly reduces the nurse's workload per patient."[26]

A close parallel would be the practice of the Bell Telephone Systems of handling local requests, complaints and service calls by telephone number rather than by type of service required. Under the previous plan, the girl taking the incoming call would refer the caller to the proper office for further handling of his request; under the current system, one girl is assigned complete responsibility for assisting a certain group of subscribers--

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[26]John K. Lagemann, "Job Enlargement Boosts Production," Nations Business, XLII (December, 1954), 34-37, 79.

based upon their telephone numbers--with whatever service they might require. Orders for additional phones are taken, complaints are investigated, service is initiated, accounts are verified, and miscellaneous questions are answered by one individual. No work load data or job satisfaction questionnaire results are available but the mere fact that the companies are continuing to use the plan gives some indication that it has proven to be successful.

An interesting report on the combined effects of job enlargement and automation was published in 1956. A steam-driven electric power generating plant was converted from manual to automatic control, with an associated upgrading and enlarging of most of the jobs in the plant. Many of the new responsibilities overshadowed the old to the extent of creating completely new jobs instead of just enlarging old ones, but the tasks themselves were discernible to the point that the men kept the same titles. In addition to this upgrading, a system of broad retraining and job rotation was initiated, resulting in many of the employees being able to perform all of the jobs in their technical areas. After a settling-down period, attitude and job satisfaction surveys were conducted in order to measure the impact upon the working environment of the various changes. Two

significant points appeared in the results of these surveys:

> The effects of job enlargement and rotation are marked. A significantly greater proportion of men in the new plant than in the older plant report that their jobs are much more interesting and that they are more satisfied with the jobs they are doing. This feeling seems to arise generally because their jobs are more challenging. Moreover, more men feel that their jobs fully utilize their abilities.
>
> However,
>
> More men in the new plant than in the old report they feel jumpy or nervous about their work. This tension reflects both the enlargement and the feeling of inadequate training.
>
> Job enlargement and rotation have resulted in greater job interest and satisfaction, but also in a higher tension level on the job.[27]

That the tension level increased with the upgrading of jobs and broad retraining of men is not surprising; it is doubtful, however, that it would be possible to determine whether or not any of the increased tension level resulted, in this particular situation, from the basic enlargement of the jobs. Again, the data which would be necessary to make such an evaluation are unavailable; no attempt was made to isolate external influences.

Two recent investigations have been performed by Professor M. D. Kilbridge of the University of Chicago.

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[27]Floyd Mann and Richard Hoffman, "Individual and Organizational Correlates of Automation," Journal of Social Issues, XII (1956), 7-17.

These investigations do not follow the general trend of job enlargement research and the published results are quite interesting.

The first report tells of enlarging the job of assembling a small pump. The change in the job design resulted from the gradual obsolescence of the pump itself; the item was being phased out as an item of manufacture. Previously, six men worked on a conveyorized assembly line producing the pump; the number of men working was later reduced to four and finally to one. In each case, as a reduction in labor force occurred, a corresponding increase was made in the number of tasks being performed by each man.

Kilbridge reports that the number of minutes expended per pump was reduced as the number of workers decreased, as shown in the following table:[28]

	Time in Minutes		
Standard Work Time	Six Man Line	Four Man Line	One Man
Productive Work	1.39	1.39	1.39
Non Productive Work*	0.30	0.28	0.10
Balance-Delay	0.08	0.09	--
	1.77	1.76	1.49

*"Non Productive Work" includes handling of work and tools, operator movement to and from work, etc.

[28]Maurice D. Kilbridge, "Reduced Costs Through

Kilbridge notes that the change in labor hours expended and the accompanying increase in production have resulted from a change in job design and not from any increase in job satisfaction on the part of the worker or ability to work faster because of less fatigue or monotony. He points out that, while quality did improve as a result of these changes, ". . . the internal record keeping system was not adequate to provide a measure of the improvement."[29] Turnover could not be measured because of the short duration of the one man design.

As the performance and quality increases of this investigation result from changes usually considered to be beyond the scope of the narrow definition of job enlargement, the utilization of these published results in presenting an argument against specialization is open to criticism. It should be pointed out, however, that side benefits such as this reduction in non-productive work may accompany the use of job enlargement and may serve to offset any loss of effectiveness or increase in training time. It may be that the results reported by Kilbridge could have been obtained by methods analysis and the application of line balancing techniques rather than by enlarging the job.

Job Enlargement--A Case," The Journal of Business, XXXIII (October, 1960), 357-362.

[29] Ibid.

Kilbridge also reports a survey conducted among 202 assembly line workers in a Chicago electronics plant. The group was composed of workers with more than one year's experience and with jobs which varied, in length of time required to execute, from one to five minutes. In actual years of service, the men's average for the group was six years; the women's average, four and a half years.

In order to measure the group's reaction to line pacing and to the number of tasks in the job, two questions were asked:

1. Given a certain assembly line, would you rather assemble 200 items per day or 400 items per day?
2. Which do you prefer, a manually operated push between stations or an automatic conveyor belt line?

The first question was designed to give a relative measure of how many workers preferred a job taking approximately two minutes to perform as contrasted with a job taking only one minute to perform. The second question was designed to measure the group's attitude toward machine pacing as opposed to a rate set by the group itself. The results, as shown below, are somewhat

surprising:[30]

Question No. 1:

	Number of Answers	Percentage
Prefer One Minute Job	104	51
No Preference	74	37
Prefer Two Minute Job	24	12

Question No. 2:

	Number of Answers	Percentage
Prefer Conveyor Belt	170	84
No Preference	12	6
Prefer Manual Push	20	10

These conclusions, which seem to conflict with the conclusions of Marks, Walker and others, were supported by Kilbridge in a theory that there may be nothing inherently dissatisfying about either conveyor belt pacing or highly specialized jobs, but that individual differences may play a big enough part to sway the results of an investigation of this type. He concludes that we do not really know very much about the impact of specialization upon job satisfaction and that the great amount of information necessary for arriving at knowledgeable conclusions is not available.[31]

An interesting study which lays the ground work

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[30]M. D. Kilbridge, "Do Workers Prefer Larger Jobs?" Personnel, XXXVII (September-October, 1960), 45-48.

[31]Ibid.

for more experimentation in the area of job enlargement was reported by Davis and Werling in 1960. This work was an attempt to define or identify the job factors that correlate with accepted criteria of productivity or high performance.[32]

The investigation consisted of presenting a questionnaire to the employees of a small chemical manufacturing plant, two departments of which had undergone a job enlargement program at the instigation of management three and one half years earlier. The enlargement of the jobs in the maintenance and distribution departments, which consisted primarily of upgrading the jobs and cross-training the workers, resulted in decreased labor costs and improved quality. Davis and Werling then made an attempt to isolate those job factors which had contributed to the increased productivity and improved quality which was experienced by these groups.

The questionnaire was given to all of the employees in the plant with the exception of one department. It consisted of 146 questions, three of which were open ended and the rest of which were multiple choice. The criterion variables used were quantity of output, quality

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[32]Louis E. Davis and Richard Werling, "Job Design Factors," Occupational Psychology, XXXIV (April, 1960), 109-132.

of output, departmental operating costs and absences. Turnover was not used because of the negligible amount of turnover occurring prior to and during the job enlargement period. The authors explain their methods of analysis:

> Two analyses of the questionnaire responses were undertaken. The first was directed at identification of job factors associated with the criterion variables and proceeded by means of a correlation analysis and a method of job factor identification. The second was directed at examination of the responses (in terms of job content, methods and perceptions) which distinguished the enlarged jobs of the A (Maintenance) and D (Distribution) groups from other jobs in the plant.[33]

The results of the first analysis are given in Table V.[34] The job factors identified were: restricted, closely specified job; fully specified work assignment and rate; having full work assignment; importance of job; identification of high quality needs; independence of control over quality; identification of performance with success in company; worker control over work organization, including rate; high evaluation of fellow workers; independence of control as to variety of work and preparatory activities; success in company related to management fairness; communication; and wide job knowledge. The authors, in discussing these factors, state:

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[33] Ibid., p. 120.

[34] Ibid., p. 124.

TABLE V

SUMMARY TABLE OF JOB FACTORS ASSOCIATED WITH PERFORMANCE CRITERIA

	CRITERION VARIABLE (PERFORMANCE INDICATOR)	JOB FACTORS
1.	Mean Quantity of Output	Restricted, closely specified job
2.	Improvement in Quality of Output	Fully specified work assignment and work rate
3.	Reduction in Operating Costs	Full work assignment
4.	Mean Quality of Output	1. Perception of job as being important 2. Identification of high quality needs; independence as to control of quality; identification of high performance with success in company 3. Worker control of work organization including rate; high evaluation of fellow workers 4. Peer communication
5.	Improvement in Quantity of Output	1. Full work assignment and some independence as to variety and rate of work; wide job knowledge 2. Specified work assignment and independence as to preparatory activities 3. Relates success to management fairness; minimal standards of performance; specified work rate
6.	Absence Rate	1. Wide job knowledge 2. Full work assignment consisting of production activities 3. Full work assignment

> Although there are few job factors that have been identified, those of identification of quality needs, control over quality and preparation activities, control over work organization, and wide job knowledge are in need of additional study under controlled experimental conditions. This is particularly indicated because these factors are notably absent in current job designs in manufacturing industries.[35]

The second analysis of the questionnaire data was carried out by identifying those responses for the maintenance (A) and distribution (D) groups whose means were significantly the highest and lowest. These responses are shown in Table VI.[36]

In discussing the highest and lowest responses, Davis and Werling note the differences between the two departments and conclude that the jobs in the maintenance department have been enlarged to a greater extent than those in the distribution department. Although the department compares favorably with other departments in the plant, the authors report that:

> Examination of the enlarged low variety, low skill, moderately repetitive jobs of the D group . . . raises a question as to whether sufficient enlargement has been introduced to satisfy management's original objectives and workers' needs.[37]

Davis and Werling conclude that nine factors have been identified for future studies in job design:

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[35] Ibid., p. 124.

[36] Ibid., p. 127.

[37] Ibid., p. 128.

TABLE VI

RESPONSES OF "A" AND "D" GROUPS WHOSE MEANS ARE SIGNIFICANTLY (AT FIVE PER CENT LEVEL) THE HIGHEST AND LOWEST

I. Responses which were significantly highest
   A. "A" Group Jobs: General Maintenance Repairmen
      1. I do this job much better than average of others
      2. I usually decide what tools to use for my job
      3. I know about products worked on in other departments
      4. I get tools needed from toolroom on my job
      5. I make some calculations in doing my job
      6. I have to meet time standards on my job
      7. I plan how I will do my job more than on my previous job
      8. I plan what tools I will use more than on my previous job
      9. Variety of work is greater than on my previous job
      10. Opinion of other workers on the importance of my job is higher on this job
      11. At times I am doing my work I have no way of knowing how things are going
      12. I don't hear from anybody unless I make a mistake
      13. If my job were not done properly I would have to do it over again
      14. There are duties I would add making it possible for me to do a better job
      15. There are duties I would add to my job making it possible for my work group to do a better job
      16. I definitely prefer having my jobs planned or laid out for me
      17. I feel the company encourages workers to contribute short cuts, recommend new tools, etc.
      18. I feel that workers should contribute more short cuts than they do now
      19. I feel people have to work much harder here than they do in other companies
      20. I feel that the company usually tries to place a man in a job that is best for him

TABLE VI (continued)

21. Being adequately qualified is important to advancement here
22. Chances for getting ahead are greater than on my previous job
23. Increasing company success would mean better pay for me
24. What I like about my job is the chance to learn new skills through company training

B. "D" Group Jobs: Distribution Workers (Packaging, Filling, etc.)
1. I usually work with more than five others on my job
2. I usually have to keep up with a machine or conveyor on my job
3. Seniority is important to advancement

II. Responses which were significantly lowest (To properly interpret the responses, it may be well to read them in the negative)

A. "A" Group Jobs:
1. I usually don't hear from anybody how well I did my work
2. I definitely prefer always working in one department
3. The way management treats me is better on my present job
4. Company and management are what I like most about my job

B. "D" Group Jobs:
1. My department is above average compared with others
2. My friends in the company work in my department
3. Outside the plant I frequently associate with people from my department
4. I usually work to close tolerances or specifications
5. I usually get written instructions on how to do my job
6. I usually work by myself
7. I usually decide what needs to be done on my job
8. I usually use instruments to make my own observations or tests to find out how things are going while doing my job
9. I usually have a more experienced man check my work to find out how things are going while doing my job

TABLE VI(continued)

10.	When I need help on how to do my job I go to the superintendent
11.	When I need help on how to do my job I usually go to the most experienced man in my group
12.	I usually have enough time to do my job as I like to see it done
13.	I know all the stages required to finish the product after I worked on it
14.	The foreman on this job is better than on my previous job
15.	I feel good work is recognized and appreciated by the supervisors
16.	Having interesting work is what I like about my job
17.	Doing an outstanding job is important to getting ahead in the company

1. Fully specified work assignment consisting of production activities.
2. Perception of having a full work assignment.
3. Perception of job as being important.
4. Identification of job's high quality needs.
5. Identification of high performance with personal success.
6. Independence of control over work organization, rate and variety, and over preparatory activities.
7. Communication with others.
8. Wide job knowledge.
9. Fully specified work assignment as to methods of work and rate.[38]

They emphasize that the study has not validated the relationship between each factor and increased productivity but has given an indication for future studies that these factors are significant determinants of employee attitudes.

In discussion of the importance of job enlargement in the broad area of job design, the authors state:

> Job enlargement that increases skills of jobs, adds controls over work content, rate, and quality, adds completion activities, and permits the development of wide job knowledge seems to yield reductions in operating costs, and increased quality and quantity of output. And when enlargement proceeds to the point of providing a skilled job, workers seem to become positively more responsive to many problems and issues of concern to management. This responsiveness seems to be what management strives for in attempting to develop what is referred to as job interest.[39]

This study has gone beyond the typical investigation into the validity of job enlargement and has

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[38] Ibid., p. 129.

[39] Ibid., p. 130.

effectively opened the door into the broader area of job design. The results of the study are presented here to show the type of experiment that will be necessary to expand the job enlargement concept to its fullest extent, and to record the continuing work of L. E. Davis who is, along with A. R. N. Marks, one of the pioneers of the job enlargement investigations.

A secondary value, however, results from the comparison of the identified factors which bear upon productivity with some of the factors which would necessarily become a part of the "enlarged" job.

Five of the nine identified factors could be expected to be maximized through job enlargement. These five are:

1. Perception of job as being important.
2. Identification of job's high quality needs.
3. Identification of high performance with personal success.
4. Independence of control over work organization, rate and variety, and over preparatory activities.
5. Wide job knowledge.

The increase in the workers' perception of the job as being important will certainly result from job enlargement as it is now conceived. The addition of

responsibility and the increase in the scope of the job both carry the connotation of increased importance, as does the increased training usually resulting from job enlargement.

The identification of high quality needs was evident in the IBM study and was shown to be lacking in Walker's automobile assembly line study. The concept of job enlargement includes the addition of the responsibility for high quality standards.

The identification of high performance with personal success depends more on the organization than on the job design, but the added responsibility for quantity and quality of work will enable management to identify and reward the exceptional worker with improved effectiveness.

The independence of control over various facets of the job will be emphatically changed through job enlargement. The increased responsibility for quality and quantity will coincide with a greater degree of freedom and independence over both the rate and method of performing the work.

A wide job knowledge will result from the necessity for broader training under job enlargement. The increase in the number of tasks along the work flow will also result in an expanded concept of the total

process design.

Two of the identified factors would probably not be affected by the enlargement of the job. These are:

1. Perception of having a full work assignment.
2. Communication with others.

The remaining two factors would seem to be subject to reduction in importance as a result of enlarging the job. These are:

1. Fully specified work assignment consisting of production activities.
2. Fully specified work assignment as to methods of work and rate.

The specification of the job will become less rigid through enlargement in order to allow for individual initiative and to reduce monotony. This identified need for a closely specified job will not be met except as it may be identified with closer quality specifications or with a close specification over a larger portion of the work. This would seem to be a potentially important area for additional experimentation.

The last case study which will be reviewed was reported by Argyris in 1959.[40] Like Davis, Argyris feels

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[40]Chris Argyris, "The Individual and Organization--An Empirical Test," Administrative Science Quarterly, IV (September, 1959), 145-167.

that job enlargement per se does not effectively embrace the full scope of job design investigations but feels that the repetitive job fails to fulfill the more mature needs of the individual worker and forces immature dependency upon him. Job enlargement, he would contend, is one method of increasing the worker's maturity and potentially his job satisfaction and cooperation.

Argyris' investigation took place in an organization employing 300 workers in two major divisions, "A" and "B". The A group consists primarily of highly skilled employees who apply their skills to produce a complex end item. Most of the employees are craftsmen and many are concerned with turning out a finished product. Group B, on the other hand, consists almost entirely of workers performing semiskilled or unskilled tasks. Argyris emphasizes that technology alone separates the two groups: "The formal organization policies, leadership, and controls are the same for both departments."[41]

As a guide to recognizing Argyris' reasoning in constructing his investigation, a summary of his concept of human personality development is given below. As will be shown later, his investigation traces the ability of

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[41] Ibid., p. 150.

the two types of jobs to meet the general needs of the fully developed personality.

It is assumed that human beings in our culture:

1. Tend to develop from a state of passivity as infants to a state of increasing activity as adults.
2. Tend to develop from a state of dependence upon others as infants to a state of relative independence as adults.
3. Tend to develop from being capable of behaving only in a few ways as an infant to being capable of behaving in many different ways as an adult.
4. Tend to develop from having erratic, casual, shallow, quickly-dropped interests as an infant to having deeper interests as an adult.
5. Tend to develop from having a short time perspective (i.e., the present largely determines behavior) as an infant to a much longer time perspective as an adult (i.e., where the behavior is more affected by the past and the future).
6. Tend to develop from being in a subordinate position in the family and society as an infant to aspiring to occupy an equal and/or superordinate position relative to their peers.
7. Tend to develop from a lack of awareness of self as an infant to an awareness of and control over self as an adult.[42]

Because the workers in group A perform tasks which meet more of the "mature" individual's needs as shown above, Argyris feels that their attitudes toward their work and toward the organization will be more mature--that, in short, they "should tend to be more

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[42]Chris Argyris, Personality and Organization (New York: Harper and Brothers, 1957), p. 50.

creative, to learn more, to have a greater sense of self worth, and to develop more lasting friendships" in contrast with the workers in the B group, who "should express more absenteeism, turnover, apathy, submissiveness, and so forth."[43]

Argyris conducted interviews over a period of seven months with thirty-four employees from the A group and ninety from group B. The following comments were made about their jobs by the percentage of each group as indicated:[44]

	Per Cent Responding:	
Comment	A	B
"Plenty of Variety"	94%	13%
"Dull, Monotonous"	6	87
"Much Personal Satisfaction"	83	15
"Good Leadership"	81	75
"Good Management"	68	64
"A Fair Incentive System"	62	67
"Little or No Pressure"	100	92

As the heart of the investigation, Argyris proceeded to test the following nine hypotheses:[45]

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[43]Argyris, "The Individual and Organization--An Empirical Test," p. 150.

[44]Ibid., pp. 151-153.

[45]Ibid., pp. 153-158.

1. Employees in A will tend to express a stronger desire to produce high quality work and more concern about the quality of their products than employees in B.
   Findings: The interviews show that eighty-five per cent of the employees in A report a need to produce high quality work as opposed to eleven per cent of the employees in B.
2. Employees in A will express a greater involvement and interest in their work than employees in B.
   Findings: Forty per cent of the employees in A expressed a need to learn more about their jobs; none of the employees in B expressed this need.
3. Employees in A will tend to place less emphasis on the importance of money as a reward than will the employees in B.
   Findings: Eighty-seven per cent of the employees in B placed major emphasis on money as a reward as compared with seventy per cent of the employees in A.
4. Since the employees of B are in a work world requiring behavior nearer the infantile side of the model of personality growth, they should, if adapted to this work world, view themselves as having more needs allied to the "infant" side of the model than to the mature side.
   Findings: Ninety-one per cent of the employees in A express needs for challenge and variety in their work as opposed to only thirty-nine per cent of the employees in B.
5. If the model of personality growth is valid, then mature adults, who have been coerced by organizational demands to become less mature and who have succumbed to the coercion, will tend to express a low sense of self worth. Since the organization demands more "infant" behavior of the employees, we hypothesize that the employees in B will have a lower sense of self worth than the employees in A.
   Findings: Ninety-one per cent of the employees in A stated that they have many important abilities to offer to their company or to any other company they might join. None of the employees in B expressed such an attitude.
6. Department B should experience a greater proportion of spoiled work or work requiring extra operations.

Findings: The A group scored consistently better than the statistical predictions for spoiled work, while group B scored consistently worse.

7. If we hypothesize that people with a higher sense of self worth will tend to be more willing to admit their limitations than those who have a lower sense of self worth, then one would predict a greater willingness on the part of employees in A to blame themselves for their errors.
   Findings: All of the employees in A, but only ten per cent of the employees in B, report that they are probably responsible for their own errors and spoiled work. In contrast to this position, fifty-one per cent of the employees in group B blame other departments for their errors, waste, scrap, etc.
8. One can hypothesize that employees having a high sense of self worth and obtaining important (to them) satisfactions should make friendships that endure outside the work place, whereas employees who do not obtain deep personal satisfactions on the job and who have "simplified" their personalities will make few enduring friendships within the plant.
   Findings: Eighty-one per cent of the employees in group B report that they have no close friends among their fellow workers. Only forty per cent of the employees in A report a similar situation.
9. It is hypothesized that the employees with a greater sense of self-actualization will also tend to be more creative and productive outside the organization.
   Findings: Eighty per cent of the employees in A as opposed to only seven per cent of the employees in B report an interest in creative outside activities (cabinet making, electrical work, plumbing, heating, etc.), while ninety-three per cent of the employees in B as contrasted with twelve per cent of the employees in A report an interest in non-creative outside activities (watching TV, reading the paper, trimming the lawn, etc.)

Not all of the data supported the hypotheses. It was found that both groups resisted unionizing to about the same degree, that upward mobility was desired to an equal extent by both A and B, and that about ninety-five per cent of the employees in both groups are disinterested with respect to general information about the company or with broad company problems. It was also found that absenteeism, turnover, and transfer are so low in both departments that no records had been kept.

Argyris identified eleven predispositions among the employees, defining "predisposition" as "a tendency to act in a particular situation."[46] These predispositions are as follows:

1. Togetherness in relation to other employees. The feeling that the employees like each other without knowing each other or experiencing close human relationships.
2. Wages guaranteeing a fair standard of living and a secure job.
3. Non involvement in the formal activities of the organization. The need not to feel responsible for anything about the organization except one's specific job.
4. Control over one's own immediate work environment.
5. Passiveness in relation to the boss and the demands of the organization, preferring to receive directions rather than to direct others.
6. Aloneness in relation to other employees. The need to have, ideally, no interaction with other employees.

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[46] Ibid., p. 160.

7. Variety in one's work. The need to perform many and different tasks while at work.
8. Routine in one's work. The need to perform few and similar tasks while at work.
9. High quality work. The desire to aspire toward high quality workmanship.
10. Directive toward others. The desire to initiate action for others.
11. Generalist in one's work. The desire to perform at a high level of proficiency all the jobs within the job family in which one works.[47]

Argyris tabulated the percentage of each group which had, according to his data, felt that the predispositions were "important," "very important," or "extremely important." The results are shown in Table VII.[48]

He goes on to list the predispositions in rank order for the two departments, taking into account both the degree of importance and the frequency of choice. The results are shown below:[49]

Group A	Group B
1. Control	1. Wages
2. Wages	2. Non Involvement
3. Non Involvement	3. Togetherness
4. Togetherness	4. Control
5. High Quality Work	5. Passiveness
6. Variety	6. Routine
7. Generalist	
8. Directive	

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[47] Ibid., p. 160.

[48] Ibid., p. 161.

[49] Ibid., p. 162.

TABLE VII

PERCENTAGE OF RESPONSES BY GROUPS "A" AND "B" TO PREDISPOSITIONS CLASSIFIED BY RELATIVE IMPORTANCE TO THE EMPLOYEE

PREDISPOSITION	IMPORTANT		VERY IMPORTANT		EXTREMELY IMPORTANT		TOTAL	
	A	B	A	B	A	B	A	B
Control	12	35	35	37	50	16	97	88
Noninvolvement	40	7	32	36	25	43	97	86
Togetherness	44	43	32	31	21	17	97	91
Variety	65	0	21	0	6	0	92	0
Wages	27	3	35	37	27	50	89	90
High Quality Work	41	0	39	0	6	0	86	0
Directing	51	0	0	0	0	0	51	0
Generalist	12	0	15	0	3	0	30	0
Aloneness	0	42	0	49	0	7	0	98
Passiveness	0	95	0	0	0	0	0	95
Routine	0	75	0	0	0	0	0	75

Figures in per cent
N = 34

Argyris concludes by noting that both groups currently exhibit a high level of morale and attributes this to the fact that both groups are having their individual needs met. Group A employees need to "perform high quality work," to "experience variety," and to "be generalist," while the employees in B need to "be left alone," "be passive," and "experience routine." Similarly, both groups express needs for "non involvement in organizational activities," "control over the job," "employee togetherness," and "fair wages."[50]

The results of this study are significant in that they point up the differences between jobs as perceived by the workers and the differences in individual personalities as brought out by the jobs. The criteria established previously for evaluating job enlargement has, however, not been met. There was no attempt to make any change in the design of the job; no quantitative changes were measured; no control group was set up. The contribution of the study to the broader area of job design, however, is of greater significance.

The lack of any definitive means of measuring the impact of job enlargement on costs or productivity leads

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[50] Ibid., p. 162.

to an attempt to justify the concept on the basis of inferred results and common sense. To this, the following chapter will add the weight of a considerable amount of psychological and sociological research in areas directly and indirectly related to job enlargement and job design. The information to be presented is not intended to replace sorely needed experimental data but it will serve both to construct a better foundation for future investigations and to explain more fully those experimental results which have previously been reported.

CHAPTER V

THE RELATIONSHIP OF OTHER FACTORS TO JOB ENLARGEMENT

"Probably no other situation brings together at one time so many antagonistic behavior determinants as does work."[1]

Benton J. Underwood

I. INTRODUCTION

To appreciate fully the complex problems associated with job specialization it is necessary to identify and examine various factors which may influence the organization's or the individual's attitude toward the enlarged job. Chapter IV pointed out the lack of data dealing with the impact of job enlargement upon productivity and upon job satisfaction. There is a similar lack of data concerning the way in which these factors fit into the broad pattern of job design or the extent to which they may be utilized or manipulated to achieve a predetermined result.

Many of the factors discussed in this chapter have not been examined in previous job enlargement

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[1]Benton J. Underwood, Experimental Psychology (New York City: Appleton-Century-Crofts, Inc., 1949), p. 567.

investigations. Some have been omitted because of the difficulty of measuring their influence upon employee behavior, while some are outside of the immediate area of job enlargement as it has generally been defined. Others are factors which have carried different titles but which have the same essential connotations as factors observed in previous studies.

The factors have been separated into three general areas: the interaction between the individual and the organization; the influence of the organization upon the individual; and the influence of the individual upon the organization. The placing of factors into these groups is done as a matter of convenience in presentation and not in an attempt to establish a general theory of job design.

II. THE INTERACTION BETWEEN THE INDIVIDUAL AND THE ORGANIZATION

Individual, group, and organizational goals. The Hawthorne experiments[2] gave the first indication of the manner in which individual employees set up group and individual norms which are different from those

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[2]F. J. Roethlisberger and William J. Dixon, Management and the Worker (Cambridge: Harvard University Press, 1939).

established by the organization. Experience has shown that any action taken is perceived by the employee to be rational and consistent with existing conditions, regardless of the seeming irrationality of this action in the eyes of the employer.

This attitude on the part of the employee is extremely important in the area of job design; almost all of the research in the area of job enlargement has shown that if an employee perceives a job to be monotonous, all of the negative attitudes appear, even though a systematic study of the job may indicate that the number and length of tasks are sufficient and that job enlargement is not required. Argyris[3] pointed out that even employees who exhibit a great deal of job satisfaction may be relatively unconcerned about the objectives or problems of the organization as a whole.

All this would indicate that along with a scientific approach to job design, an extensive survey must be made to determine which jobs are perceived by the workers to be monotonous and in need of enlargement. Upon determining this, an equally comprehensive selling job must be accomplished to attempt to align the workers'

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[3]Chris Argyris, "The Individual and Organization--An Empirical Test," Administrative Science Quarterly, IV (September, 1959), 159.

goals with management's objectives as much as possible. The awareness of the problem is of importance here; an attempt to formulate an all-purpose solution is premature. Without this awareness, however, any program to enlarge jobs is destined for eventual failure.

Personality molding by the organization. Some investigators have theorized that the organization can, over a period of time, manipulate the employees in such a manner as to cause a change in personality. Argyris[4] contends that this manipulation slowly erases the problem of repetitive work and monotony by repressing those elements of the worker's personality which rebel against these conditions. If this is the case, then the job design practitioner will have to deal with individuals whose personalities may run the gamut from independence to extreme dependence upon the organization. The effective measurement of the group norm with respect to personality maturity may be of little value, since the critical factor in a job enlargement program is the individual attitude rather than the group attitude toward monotony and need fulfillment.

III. THE INFLUENCE OF THE ORGANIZATION UPON THE INDIVIDUAL

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[4]Chris Argyris, Personality and Organization (New

Selection and placement. Most writers in the area of job design attach great importance to proper employee selection and placement. Half a century ago Taylor wrote:

> For one class of work, men should be selected who are too good for the job; and for the other class of work, men who are barely good enough.
>
> If the work is of a routine nature, in which the same operations are likely to be done over and over again, with no great variety, and in which there is no apparent prospect of a radical change being made, perhaps through a term of years, even though the work itself may be complicated in its nature, a man should be selected whose abilities are barely equal to the task. Time and training will fit him for his work, . . . since he will be better paid than in the past, and will realize that he has been given the chance to make his abilities yield him the largest return. . . . On the other hand, if the work to be done is of great variety--particularly if improvements in methods are to be anticipated--throughout the period of active organization the men engaged in systematizing should be too big for their jobs. For such work, men should be selected whose mental caliber and attainments will fit them, ultimately at least, to command higher wages than can be afforded on the work which they are at.[5]

More recently Drucker has stated that "Right placement is not only in itself a major source of job satisfaction; it is a prerequisite to any satisfaction or function fulfillment."[6] Other investigators, having

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York: Harper and Brothers, 1957).

[5]Frederick W. Taylor, "Shop Management," in Scientific Management (New York: Harper and Brothers, 1947), pp. 141-142.

[6]Peter F. Drucker, The New Society (New York: Harper and Brothers, 1949), p. 169.

emphasized the individual differences found in employees, give an indication that a careful mating of worker and job is necessary.

Placement is not offered as a panacea, however. Most writers recognize the difficulties involved in adequately measuring the worker's personality while others contend that it is not yet possible to measure with accuracy the demands of the job upon the worker. If such is the case, then selection and placement are founded upon the somewhat difficult task of comparing two variables, neither of which can be evaluated with the necessary degree of accuracy. As Drucker notes:

> Placement is a matter of the whole man--his abilities, his interests, his emotions, his values--and of the men he is working with. Any (placement) test can measure only a few facets of a man's personality.[7]

From a practical standpoint, personnel selection and placement can supplement and reinforce job enlargement by employing persons who desire additional responsibility in enlarged jobs and placing others who are more adaptable to repetitive work in those positions where job enlargement is less feasible. The degree of accuracy obtained in measuring these desires and adaptabilities will continue to affect the workers' potential

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[7] Ibid., p. 170.

job satisfaction and ability to perform, however.

Pacing and job lots. The conveyor belt appears both to attract the worker with its power and to repel him with its autocratic indifference to his problems. Walker[8] and Marks[9] both report contradictory responses to belt pacing--the same employee may indicate a preference for the conveyor system but also voice a strong dislike for mechanical pacing.

Some writers, notably Wyatt[10] and Maier,[11] have proposed organizing work in "job lots" in order to create flexibility in the work pace and to establish "sub goals" that can be met throughout the day to give the worker a stronger feeling of accomplishment.

The enlarging of jobs does not necessarily result in the establishment of bench-type or job-lot operations; part of its strength lies in its flexibility

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[8]Charles Walker and Robert Guest, The Man on the Assembly Line (Cambridge: Harvard University Press, 1952).

[9]A. R. N. Marks, "An Investigation of Modifications of Job Design in an Industrial Situation and Their Effects on Some Measures of Economic Productivity," PhD Dissertation, Unpublished, University of California, Berkeley, 1954.

[10]S. Wyatt, J. N. Langdon, F. G. L. Stock, Fatigue and Boredom in Repetitive Work, Industrial Health Research Board Report No. 77 (London: 1937).

[11]Norman R. F. Maier, Principles of Human Relations (New York City: Wiley and Sons, 1952).

with respect to existing conveyor belt systems. In general, however, it is important to consider the use of sub goals to supplement the implied increase in the feeling of accomplishment which should be effected through job enlargement.

Job prestige. One of the stated objectives of job enlargement is to add meaning or prestige to the job. It is important that this prestige be real and not exist only in the mind of the supervisor. As Blum states:

> Many jobs can be made more interesting provided meaning is attached to the work. By this we do not mean assuming a "Pollyanna" attitude and attempting to create meaning where no meaning exists; workers are too smart for these tactics. However, explaining to the worker what his task is in relation to the organization as a whole often gives him a sense of the meaning of his job that he could not have gained by himself.[12]

Training time. The training time for a job, which depends to a great extent on the skill level required, may be considerably lengthened by the enlargement of the job. In addition, many proponents of job enlargement have suggested cross training to further upgrade the employee's proficiency. Lehrer[13] reports a

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[12]Milton L. Blum, Industrial Psychology and its Social Foundations (New York City: Harper and Brothers, 1956), p. 382.

[13]Robert Lehrer, "Job Design," Journal of Industrial Engineering, IX (September-October, 1958), 439.

change in training time from one week to eight weeks as a result of a job enlargement program; the actual change involved will depend to a great extent on the similarity between the old and new versions of the job. The ratio of eight to one would appear to be extreme, however.

The work station. Walker[14] and Marks[15] have reported a desire on the part of the worker to see the finished product or sub assembly. Other investigators imply that this corresponds to a feeling of accomplishment and that the proximity of the work station to the final assembly point is at least a partial determinant of job prestige.

The implication here is that the position of the work station relative to the final assembly point must be taken into consideration, or that some other means of identification with the finished product must be built into the job. Many artificial ways of doing this have been proposed, such as providing displays of the finished product throughout the plant, showing movies of the product in use, etc. The success of these measures has not been conclusively determined.

The degree of planning. The amount of planning

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[14]Walker and Guest, loc. cit.

[15]Marks, loc. cit.

done by supervision will influence the design of the job to the extent that this planning infringes upon personal initiative and the employee's control over the work situation. The job design technique will usually dictate the amount of planning to be accomplished; where this is not clearly delineated the attitudes of the individual supervisors will have a great deal of bearing upon the employee's job satisfaction. The enlargement of the job will, in most cases, reduce supervisory pre-planning, although this cannot be proposed as a criterion for job enlargement.

Many investigators have recorded instances in which the use of participation in group pre-planning resulted in increased cooperation on the part of the employee. Lehrer[16] reports the use of participation in the introduction of new methods; Argyris[17] discusses the use of group planning of day-to-day production activities. The enlargement of the job, while separate from the use of employee participation in planning, will enhance the effectiveness of participation to the extent that it makes the employees more self-reliant, increases

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[16]Lehrer, loc. cit.

[17]Chris Argyris, Personality and Organization (New York: Harper and Brothers, 1957).

their ability to accept responsibility, or aligns their interests with the objectives of the organization.

IV. THE INFLUENCE OF THE INDIVIDUAL UPON THE ORGANIZATION

Individual maturity. The maturity of the employee, including his ability to accept a certain degree of responsibility and to act in a manner indicative of a well-developed personality, will influence to a great extent any program of job design initiated by the organization. Argyris[18] discusses personality growth and maturity at some length; the point is made that the individual with a mature outlook on life may not be satisfied with repetitive work but may be able to accept it by dint of his strength of character and ability to bear up under uncomfortable circumstances. If, however, his dissatisfaction with the work exceeds his ability to accept his fate he may also have sufficient initiative to look for other employment. Smith[19] notes that the maturity of the individual seems to be the major determinant of susceptibility to monotony and states that younger girls and girls from insecure home environments

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[18] Ibid.

[19] P. C. Smith, "The Prediction of Individual Differences in Susceptibility to Industrial Monotony," Journal of Applied Psychology, XXXIX (1955), 322-329.

appear to be least qualified to perform well on a "monotonous" job.

The factor of individual maturity makes up one part of the composite factor of "total background" which will be discussed in detail at a later point in this paper.

Satiation. The observation that repetitive work causes a gradual decrease in the employee's ability to perform was first noted by Karsten in Germany in 1928. Maier[20] discusses Karsten's experiments in detail; the major points will be presented here.

German university students were used as subjects in a series of experiments to determine the parameters of satiation. In one instance, the students were asked to draw lines on paper in alternate groups of twos and threes. As the students filled each sheet of paper, another sheet was provided, but they were not allowed to stop.

> With continued work on such simple repetitive tasks, variations in the work pattern began to appear. Such innovations as large and small lines, heavy and light strokes, tilted and curved lines were common. The method of making similar lines was also changed. Sometimes the lines were made with upward and sometimes with downward strokes. A great deal of variety was also achieved by changes in the work

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[20]Norman R. F. Maier, Psychology in Industry (Boston: Houghton Mifflin Co., 1955), pp. 471-474.

> rhythm. Occasionally, whole pages were filled by a few long strokes; in such cases the paper supply was merely replenished more often . . . Gradually the quality of the work declined further until it was sometimes difficult to make out what was being done. Only the aspect of grouping into twos and threes seemed to connect the later stages of work with the earlier ones. After about four hours the average subject reached a point where he could no longer continue. This was the stage of complete satiation.[21]

Satiation was similarly reached when subjects were asked to read the same poem over and over. Interpretive variations appeared first, followed by errors in reading and then by mispronounced words. Finally, after a period of hours, the subject only stuttered and choked and was unable to go on. Maier characterized the stages of satiation as being (1) variability, (2) reduction in quality, (3) difficulty in continuing to make the necessary movements, and (4) complete inability to go on.[22]

> Another aspect of the experiment showed that variability in work delayed the onset of complete satiation. Individuals who were ingenious in finding variations in the execution of the task were able to continue longer. When the experimenter introduced variations in the task, the stage of complete satiation was postponed. . . . However, each change in instruction became less beneficial, so that eventually a whole type of activity (such as line drawing or reading) was satiated. Variations prevented the satiation of a given task, but they

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[21] Ibid.

[22] Ibid.

did so by spreading the satiation effects over a larger area.[23]

To test the conclusions, a group of unemployed men were hired at a nominal sum to serve as subjects. These men worked a full eight hour day and performed as well at the end of the day as they had at the beginning. They found the work to be pleasant and one man asked for the job on a permanent basis.

Maier points out that the difference in the two groups stemmed from their attitudes toward the work. The men thought of a fixed amount of work and of being paid for each hour on the job. The students had the feeling of running on a treadmill; the paper supply was constant and the job seemed to be endless.

> The absence of the experience of a goal or end toward which one moves seems to be the cause of satiation, a cause which depends completely upon the way one views the task . . . The same task may appear quite unlike to people with varied backgrounds and different nervous systems . . . What appears to be unimportant modifications in the arrangement of a task may actually change the whole outlook of a group of dissatisfied workers. . . . Pleasant and unpleasant tasks were satiated at the same rate, but more quickly than tasks for which there was no emotional feeling. This finding suggests that satiation is more than mere dislike for a job. It is a condition of being disturbed because of the failure of action to lead to anything . . . rather than because of the inherent nature of the task.[24]

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[23] Ibid.

[24] Ibid.

Satiation of an employee at a production line, then, might cause serious morale problems or a breakdown in adherence to specifications of tolerances. That workers can become bored is not questioned; the concept of satiation, however, has been questioned by Ryan and Smith:

> The Karsten technique of studying satiation involves such an unusual set of motivating conditions for the activity that it is extremely difficult to see how they could apply to an industrial situation. In brief, subjects were asked to perform a simple, uniform task, such as drawing series of vertical lines, until they felt like stopping. The motivation consisted in general of cooperating with an experimenter, although it varied from subject to subject. This is, of course, quite different from the motivating conditions in a job. In addition, the fact that the task was to go on to an indefinite point when the subject felt like stopping was not only abnormal but also very ambiguous. With a phenomenon so delicately dependent upon the conditions of motivation of the subject, these conditions are scarcely calculated to throw much light upon it for practical purposes.[25]

There seems to be an indication in the Karsten studies that individual personality differences and the use of sub goals are important influences on the ability to perform repetitive work over a long period of time. As Ryan and Smith point out, no generalizations can be drawn from the results of this work; future experiments, however, should yield important information concerning

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[25] T. A. Ryan and P. C. Smith, Principles of Industrial Psychology (New York City: Ronald Press Company, 1954), p. 387.

monotony and motivation.

Closely related to satiation is the concept of "work inhibition" as introduced by Underwood in Chapter I:

> Learning, it has been said, is a logical construct; it is a hypothetical process inferred from an observed increment in performance. There is another logical construct applicable when a _decrement_ in performance occurs with continued repetition of a response under conditions which might previously have yielded an increment. This construct may be called _work inhibition_.[26]

Underwood goes on to identify three characteristics of work inhibition--(1) it is cumulative; that is, it is generated each time a response occurs; (2) it depends a great deal on the muscular action involved, and (3) it dissipates with the passage of time. He states that dissimilar tasks, performed consecutively, reduce the work inhibition resulting from repetitive work.[27]

Since satiation and job enlargement techniques are both highly nebulous concepts, no attempt will be made to anticipate the effects of satiation of job design. It is probable that some of the observed disadvantages of repetitive work are related to satiation or to the

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[26]Benton J. Underwood, _Experimental Psychology_ (New York: Appleton-Century-Crofts, 1949), p. 561.

[27]_Ibid._, p. 562.

related area of physiological fatigue, but this has yet to be confirmed.

Intelligence. There is a great deal of disagreement concerning the influence of the intelligence of the worker upon his dislike for repetitive work. Wyatt[28] in 1938 reported that the more intelligent workers were also more susceptible to monotonous work; Ryan and Smith[29] repeated his experiments in 1954 and found that the most bored group of sewing machine operators had a slightly lower average intelligence than the least bored group. It would seem likely that a worker of relatively high intelligence would not feel challenged by a repetitive job; however, it is entirely possible that the portion of a person's personality which responds to challenge is not perfectly correlated with his overall "intelligence."

It should be pointed out that intelligence and educational level may not influence the worker's response to repetitive work in the same manner; again, a greater amount of education indicates a strong motivation and

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[28] S. Wyatt, J. N. Langdon, F. G. L. Stock, Fatigue and Boredom in Repetitive Work, Industrial Health Research Board Report No. 77 (London: 1937), pp. 19-20.

[29] T. A. Ryan and P. C. Smith, Principles of Industrial Psychology (New York City: Ronald Press Company, 1954), p. 387.

willingness to suffer present hardships for future advantages. High intelligence does not indicate any particular motivation at all and may be quite passive. This is important inasmuch as most researchers would agree that the present organizational attitude toward repetitive work is one of giving high material rewards in the present with little chance for advancement or improvement in the future.

As in most of the other cases, the influence of intelligence upon response to repetitive work and thus upon job enlargement technique is not determinable at this time. It is, however, a factor to be reckoned with and any job design program should attempt to correlate intelligence with the response to and acceptance of the new design.

Boredom and monotony. Much of the research carried out in the area of repetitive work has centered around boredom and monotony. It is generally agreed that boring work is distasteful; the problem has been in attempting to identify those factors which can be removed or adjusted so as to alleviate the situation. Maier points up another factor which complicates the situation, individual differences:

> . . . Boredom will be affected more than monotony by the following factors: (1) the personality of the person, (2) the attitude and mood of the person, and

> (3) the perception of the task performed. This means that individuals might not agree on the task that was most boring; individuals might show more boredom one day than another; and some people might become adjusted more readily to boring tasks than to monotonous ones.[30]

This observed influence of personality and mood upon the worker's attitude toward repetitive work is of vital importance to someone who must evaluate the results of a job design experiment. Since it is virtually impossible to isolate and measure these changes in attitude, an attempt must be made to minimize their effects by choosing a large number of participants in more than one geographical location and by observing their work for a relatively long period of time.

Cases have been reported in which workers have allegedly been able to combat boredom by daydreaming; that is, by performing the repetitive work in an automatic manner while letting their minds wander. This can be a dangerous process both from a standpoint of safe operation and from a standpoint of quality workmanship. Warren[31] describes an operation in a modern submarine which requires constant manual adjustments by the operator. The operations could be made completely automatic

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[30]Norman R. F. Maier, Psychology in Industry (Boston: Houghton Mifflin Company, 1955), p. 468.

[31]Neil D. Warren, "Job Simplification Versus Job Enlargement," Journal of Industrial Engineering, IX (September-October, 1958), 434.

by simple feedback networks but the constant attention to detail required by the job keeps the seaman awake and alert.

Total background and personal values. A major determinant in the area of job design, indeed perhaps the most critical factor, is bound up in the background of the individual. Man is subjected to a lifetime of action and reaction, of opinion and prejudice, of inspiration and deception. It is doubtful that an individual could properly evaluate the impact of these influences upon his attitude toward work, the work environment, supervision, organizational goals, etc.; it is even more doubtful that an outside observer could accurately measure them. The factors in an individual's background which might influence job attitude include his education, job experience, his friends outside of the job environment, his father's occupation, his union contacts, his family life, etc. The importance of these attitudes, or of the aggregate attitude, cannot be overemphasized.

In most cases, the practical approach to determining the attitude of an individual or group is one of trial and error. Certain paths of investigation may be eliminated quite effectively, however, by an observant and personnel-minded supervisor--one who "knows his men." The remaining approaches, any one of which may

yield a solution--if indeed a "solution" is desired--may be discussed with the individual or group in an attempt to enhance cooperation.

It is doubtful that a way of measuring these unrelated influences and attitudes will be discovered in the near future; indeed, it would seem that each new bit of information gleaned from man's personality makes charting that personality a more difficult and complicated task. Until this measurement is possible, however, job enlargement and other seemingly sophisticated methods of job design will continue to be quite clumsy when compared with product or process design.

Security and responsibility. Two strong personality drives, the need for security and a desire to be absolved from as much responsibility as possible, are identified by Blum as possible deterrents to job enlargement:

> Much has been written about the effect of specialization and simplification of work. People are supposed to prefer varied rather than uniform or repetitive tasks. This is not true to the extent that is ordinarily believed. The average individual gives lip service to the importance of and need for variation in work and life in general but merrily performs as many tasks as possible in a routine fashion. For example, people who ride on the subway in New York City have little need to travel on the same train each morning, since trains are likely to run just a few minutes apart. Yet many people who claim they desire variability in their work walk to the station by exactly the same route and enter the same door of the same car, day in and day out.

> Examples of the desire and preference for uniformity of tasks are endless. Many people prefer a job with a minimum of responsibility. Jobs that are varied sometimes require decisions that may get the person into trouble, whereas routine jobs are "safe" jobs. For some people a uniform task is a boon and not a boomerang.[32]

It would appear that Blum's description fits only a certain portion of the work force. Upon reflection, however, the problem becomes more complicated: some workers may exhibit desires for responsibility and variety in some situations and appear to be security-oriented in others. Indeed, if Argyris' model of personality repression is accepted, the workers will be continually changing in the direction of a less demanding attitude toward responsibility and variety.

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[32]Milton L. Blum, Industrial Psychology and its Social Foundations (New York: Harper and Brothers, 1956), pp. 381-382.

CHAPTER VI

CONCLUSIONS

> There is first the question whether "specialization" as it is understood and practiced today is a socially and individually satisfying way of using human energy and production--a major question of the social order of industrial society. There is also the question of whether "specialization" is an efficient way of using human energy and production--a major question of the technology of an industrial society.[1]
>
> Peter F. Drucker

At this point it will be helpful to review the published information dealing with job enlargement and to evaluate the sum of the research work which has been conducted thus far. Three problems of commission or omission can be discerned; for the sake of convenience, these problems, or problem areas, will be referred to as mechanical problems, psychological problems and sociological problems.

I. MECHANICAL PROBLEMS

Isolated occurances. The job enlargement studies were conducted in widely varying organizations: offices, automobile production plants, electronic equipment assembly plants, small apparatus plants, etc.

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[1]Peter F. Drucker, The New Society (New York: Harper and Brothers, 1949), p. 171.

These plants were quite different with respect to the makeup of the work force, the degree of unionization, the relationship between union and management personnel, the production methods employed, the physical layout of the plant, the type of machinery used by the employees, the type and caliber of supervisory personnel, and hundreds of other factors. It becomes meaningless to try to combine all of these studies into one common mass of data and say that job enlargement is or is not a valid job design tool. Until the total background of the job and the employee can be evaluated and isolated, the results of the various studies being conducted will be useful only in those situations in which they were established.

Type of investigation. Most of the more comprehensive investigations, notably those by Argyris,[2] Davis,[3] and Walker,[4] were conducted by submitting the participants to a series of interviews and questionnaires.

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[2]Chris Argyris, "The Individual and Organization--An Empirical Test," Administrative Science Quarterly, IV (September, 1959), 145-167.

[3]Louis E. Davis and Richard Werling, "Job Design Factors," Occupational Psychology, XXXIV (April, 1960), 109-132.

[4]Charles Walker and Robert Guest, The Man on the Assembly Line (Cambridge: Harvard University Press, 1952).

While the conclusions of these studies can be evaluated statistically, the true worth of the data obtained in this manner depends upon the honesty and cooperation of the employees. A certain amount of conflicting information received in almost every investigation of this type would lead one to believe that the subjects are either trying to anticipate the answer that the researcher wants, or else that they have conflicting desires and motives to the extent that they may express a positive feeling toward two opposite and mutually exclusive situations. The results of such investigations are probably subject to error in interpretation.

Another difficulty encountered in establishing a recommendation based on an investigation made up entirely of interviews and questionnaires results from trying to extrapolate from an attitude expressed in a survey to an increase or decrease in productivity. It is, however, this very effect on productivity or on production costs which is used by most proponents of job enlargement as its justification for use.

Use of control groups. In most of those cases where an attempt was made to establish a relationship between job design and either higher productivity or lower production costs, the use of a control group was largely ignored. The data gathering was done as a

matter of keeping business records, but outside influences were not isolated. The fault here does not rest with the investigator, since most of these programs were carried on in an attempt to reduce costs and not in an attempt to evolve a general theory of job design, but it is this type of situation which forms the bulk of the published support for job enlargement techniques. The data are of little value to the conscientious researcher unless they can be used to determine what actually causes the increased interest in a job.

II. PSYCHOLOGICAL PROBLEMS

Measuring individual response. Almost all job design changes are justified on the basis of increased productivity, improved quality, or decreased production costs. The researcher then is saddled with the task of proving that a given job design does cause a change in these variables. But are they variables? The classic Hawthorne studies proved that output is often dictated by the group; scores of other investigations since then have supported these findings. The "Economic Man" myth, which claims that the employee will increase production if he is offered the proper monetary reward, is not at all consistent with the conditions which motivate the enlargement of jobs. Indeed, many of the

highly repetitive jobs are among the most highly paid in their respective industries.

If the criterion of productivity or cost is by-passed in favor of an attitude survey, another problem in response measurement emerges. If the employees are sincere in their answers--and it should be remembered that most of the employees holding highly repetitive jobs tend to be antagonistic toward the goals of the organization--even if they answer sincerely, their attitudes, according to Argyris, are constantly changing. A negative response to a question concerning belt pacing, for example, may evolve into a neutral or even a positive response to a similar question over a period of time. There may be no black or white attitudes, but only gray ones in subtly changing shades.

Time span. Argyris[5] and Walker[6] both contend that the antagonism and rebellion caused by boring, repetitive work tends to be cumulative--to increase with the passage of time. Time, in this case, is measured in terms of months or years, rather than in hours as in Karsten's satiation experiments. Interestingly enough,

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[5]Chris Argyris, Personality and Organization (New York: Harper and Brothers, 1957).

[6]Charles Walker and Robert Guest, The Man on the Assembly Line (Cambridge: Harvard University Press, 1952).

however, no investigations of more than a few months duration have been reported. It would seem only logical that a negative attitude toward repetitive work, constantly reinforced over a period of years, would not disappear at the first contact with the enlarged job. The measurement of such variables as turnover, absence rate, per cent of spoilage, and grievance rate must be made over an adequate period of time if significant answers are to be obtained. As it has previously been noted, a longer experimentation period is also desirable for measuring the effect of job design on upward mobility, supervisory behavior, the degree of planning necessary, training time, and leadership development.

Depth of the study. Of all the work reported, only Marks,[7] Davis,[8] and Argyris[9] went beyond the scope of job enlargement to attempt to develop a theory of job design. Of course, if job enlargement techniques can be employed to obtain the optimum job design, a problem does

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[7]A. R. N. Marks, "An Investigation of Modifications of Job Design in an Industrial Situation and Their Effects on Some Measures of Economic Productivity," PhD Dissertation, Unpublished, University of California, Berkeley, 1954.

[8]Louis E. Davis and Richard Werling, "Job Design Factors," Occupational Psychology, XXXIV (April, 1960), 109-132.

[9]Argyris, loc. cit.

not exist. This, however, is not likely. More realistically, an attempt to measure the reasons for the success of job enlargement will result in certain refinements and an eventual evolution into the attempt to develop a job design theory.

An optimum job design, however, must effectively fulfill the needs of the worker. To do this involves first the extremely difficult task of identifying and measuring not only the needs of the working group but also of the individuals in that group--and no two individuals can be expected to have exactly the same needs or to respond to attempts to satisfy those needs in exactly the same way. To complicate the situation further, it must be pointed out that the emphasis here is on need fulfillment; upon enhancing job satisfaction through optimizing job design. But what assurance is there that increased job satisfaction will result in higher productivity or lower production costs? As many job design approaches are justified on the basis of an overall, long range cost reduction, it would seem necessary to first establish those factors of job design which result in increased job satisfaction and then to determine what changes in the economic facets of production result from the manipulation of these factors. A great deal of work has yet to be undertaken in this area

of investigation.

III. SOCIOLOGICAL PROBLEMS

The independence of cost. Throughout the bulk of the literature dealing with job enlargement, one point is assumed: cost must be minimized. In fact, the most revolutionary aspect of job enlargement is that it substitutes long-range cost minimization for short-range cost minimization. The overall cost of production must be reduced, and man's needs will be met insofar as they do not interfere with this unassailable position. It is against this unanimity of thought that the following statement falls:

> . . . The relation of the modern corporation to the people who comprise it--their chance for dignity, individuality, and full development of personality--may be at least as important as its efficiency. These may be worth having even at a higher cost of production.[10]

The statement is by the economist John Kenneth Galbraith who argues persuasively for a liberal change in job design. The American economy, Galbraith theorizes, is founded upon want creation and upon the deification of production. The decreasing need for goods and a declining marginal urgency of production has led us,

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[10]John Kenneth Galbraith, The Affluent Society (Boston: Houghton Mifflin Company, 1958), p. 288.

however, to the thirty-two hour work week and forced obsolescence. Galbraith would counter the former with a proposal for more meaningful work:

> It is not seriously argued that the shorter work week increases productivity--that men produce more in fewer hours than they would in more. Rather it is whether fewer hours are always to be preferred to more but more pleasant ones.[11]

Galbraith realizes that this type of thinking is not popular:

> The trend toward increased leisure is not reprehensible, but we resist vigorously the notion that a man should work less hard while on the job. Here older attitudes are involved. We are gravely suspicious of any tendency to expend less than the maximum effort, for this has long been a prime economic virtue.[12]

This, then, would appear to be the logical projection of the humanistic movement in industry, of which job enlargement is a part. Is the assembly line as injurious to personality as the sweat shops of the 1800's were to health? Does man have a right to a challenging, broadening job, even at the expense of the efficiency of the organization? These questions cannot be answered at this time, but certainly they bear serious consideration by the conscientious student of job design research.

Job satisfaction. The position taken by Galbraith,

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[11] Ibid., p. 337.

[12] Ibid., p. 336.

however, raises questions of which the economist is not aware. He speaks of challenging jobs as though every worker has a need to be challenged, but many psychologists feel that some men need security more than challenge. A general movement toward more demanding jobs would be as emotionally unsettling as repetitive jobs are now to the more aggressive workers. If such is the case, then it must be expected that more than just the two extremes of aggressive and passive workers will be represented. There will be varying degrees of need for more challenging work. How many different types of jobs are needed? Can a man be expected to be forever content with a job with a certain amount of challenge, or will this not tend to cause a progressive demand for more responsibility? Can an observer ever really evaluate a person's needs and then be continually aware of changes which may have a variety of causes? It would seem that these questions will ultimately lead to an unwieldy attempt to fit each job to the individual, a task which will not only become very difficult from an administrative standpoint but virtually impossible when it is considered that this collection of individually-tailored jobs must be organized into a relatively efficiently functioning entity in order to justify and to finance its own existence. By all rights, then, a point of optimum compromise

must be reached between an organization established purely upon the determination of lowest production cost and an organization dedicated to giving each employee the job most suited for his individual needs. At this time, however, it would not even be possible to recognize this optimum point if it were reached, since the criterion upon which the decision would be based has not yet been established, nor have the data necessary to establish it been gathered.

IV. THE PROBLEM SOLUTION

It has been pointed out many times previously, in this paper and in virtually all others dealing with job design, that more research is necessary. Man's personality must be charted; his needs must be defined and some means for meeting those needs established; an effective method for identifying various personality types must be found; a means of determining the response to various mechanical and psychological factors of a job must be found, and a satisfactory theory of job design must evolve.

In the interim, however, many industrial managers need practical approaches to the immediate problem of job design techniques for repetitive work. Based upon the information set forth in the previous chapters of

this paper, suggested approaches to the problem follow. The offering of these suggestions should not be construed to be contrary to the author's stated position that effective answers cannot be given because of insufficient data; rather, they are given in recognition of the fact that the industrial processes will not wait for what may turn out to be years of extensive research.

Job enlargement. In general, all indications are that the enlargement of jobs, when applied under the right conditions, results in lower long-range production costs. In a highly repetitive industry, where changes can be made with a minimum of interruption and expense, and where retraining and upgrading can be conveniently undertaken, it would seem wise to cautiously add to the number of tasks and/or responsibility requirements of a number of selected jobs. No guidelines exist for the decision as to how much production efficiency can be sacrificed for employee job satisfaction; the question must be answered for each individual situation. It would be hoped that comprehensive records would be kept in order to evaluate the desirability of enlarging additional repetitive jobs, including those in both the plant and office environments.

Other techniques. Certainly job enlargement is not the only tool for improving job satisfaction; it may

not even be the best. Many companies have used various forms of job rotation for years; participation in planning is generally thought to be effective in most cases, and some companies give much thought to profit sharing, employee educational programs, effective placement, and other similar approaches. None of these ideas can be classified as "job design," but all fall under the general category of "work enrichment" and are worthy of consideration.

It will be interesting to note the comments of two writers on the subject of instigating changes in job design:

> Mary Parker Follett, an astute observer of administrative practice, has noted: "When we think that we have solved a problem, well, by the very process of solving, new elements or forces come into the situation and you have a new problem on your hands to be solved." The innovations instituted to solve one problem often create others because effectiveness in an organization depends on many different factors, some of which are incompatible with others; hence, the dilemma. The very improvements in some conditions that further the achievement of the organization's objectives often interfere with other conditions equally important for this purpose . . . (for example) by routinizing tasks and lowering work satisfaction, the assembly line created problems of absenteeism and turnover--problems that were particularly serious given the interdependence of operations on the assembly line. Management had succeeded in solving one set of problems, but the mechanism by which they were solved produced new problems which were quite different from those which had existed in earlier stages of mechanization. Contrary to our expectations, the introduction of automation has not yet met the problems created by monotonous tasks and low work

> satisfaction. But should these problems be solved through a reorganization of the work force that requires operators to assume more responsibility, as we have suggested, management would no doubt be faced again with new difficulties. For example, increased responsibility and discretion in performing complex, interdependent tasks might engender anxieties over decision making which would impede effective performance, and these new problems would require management to devote attentions to developing mechanisms that reduce such anxieties.[13]

V. CONCLUSIONS

The reaction to specialized, repetitive, and monotonous work has crystalized in a theory of job design known popularly as "job enlargement." As this paper has shown, data sufficient to properly evaluate the usefulness of this tool do not exist; a premature opinion that the concept of enlarging some types of jobs is promising can be supported. It is recognized that the reasons for its success cannot be fully explained.

The value of this paper is dependent upon the reception of its secondary message: that job design ultimately requires a deeper understanding of the meaning of work and a systematic method of meeting the needs of the working individual through the organization of both the job and the production group. It is to be

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[13]Peter M. Blau and Richard Scott, Formal Organizations: A Comparative Approach (San Francisco: Chandler Publishing Company, 1962), pp. 250-251.

anticipated that those concerned with social costs in American industry will concentrate upon reaching this understanding in the future.

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